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HIDE REVISED WAVELENGTH RESOLUTION EMISSION AND TRANSMISSION MO--ETC(U)
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HIDE REVISED WAVELENGTH RESOLUTION
EMISSION AND TRANSMISSION MODEL

Data Item A007
Interim Technical Report

Prepared for

U.S. Army Aviation Material Command
AMCPM-AESWPS

Box 209, Main Station
St. Louis, Mo. 63166

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⑦ Data Item A007
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This report describes the high resolution atmospheric transmission and exhaust gas emission models to be incorporated into the HIDE (Helicopter Infrared Detection Estimate) computer.

Foreword

The requirements for the atmospheric transmission model to be used in the HIDE computer program are that it be fast and accurate.

model. The HIDE computer program is intended to predict the infrared signature of suppressed aircraft. 'Suppressed' as used here, implies masking of all hot metal, diluting the exhaust plume gasses and reducing body contrast with the background.

Thus it is not sufficient to simply concentrate on the 2-5 micron window regions for the normally predominant tail pipe continuum radiation or the 4 micron region for the selective plume radiation as seen over short to intermediate paths (less than 3 miles). Attention must be applied to the entire spectrum of interest, (1-16 microns) and over long paths (such as 40 air masses for a line of sight tangent to the horizon). This is because the signatures of self emitting sources are influenced by the relatively short intervening paths and generally dominate some spectral interval. The body contrast signature, however, is comprised from remote sources (i.e. sun, sky, albedo, etc.) which are transversing long atmospheric paths to illuminate the target and this signal is contrasted against a remote background (i.e. horizon, terrain, clouds, etc.) whose radiance has also been operated on by long path constituents.

The transmission model is the basic ingredient to predicting atmospheric emission, transmission and solar scattering all of which are important to determining body contrast. Hence it must be accurate over both the long and short paths.

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Currently the HIDE program is used to determine the 3-D profile of aircraft signatures and detection ranges. These exercises incur numerous iterations in target aspect and range. Thus machine time becomes an important factor in cost. Eventually, it is expected that the HIDE program will be used in a closed loop simulation to evaluate miss distance. This would mean near real time operation where machine time becomes a major factor. Since the transmission model is used repeatedly in a given signature prediction (i.e. solar transmission and scattering, clear and cloudy sky emission as a function of zenith, line of sight path attenuation, etc.), it is essential that it be a fast machine algorithm.

The requirements for speed and accuracy in making computer predictions on suppressed signatures were studied in depth in the Fleet Signature Study conducted for the Naval Research Laboratory contract NOnr 4991(00)(X) over the period of 1965 to 1969. The outcome of this study was a transmission algorithm of the form

$$\tau_{s,\lambda} = \text{EXP} \left\{ -\alpha (Q_s)^B \right\}$$

where: τ = Transmission

s = Species of absorber

λ = Wavelength

α = Absorption coefficient

Q = Quantity of absorber

B = Absorption exponent

This function is fast, machine wise, because there is only one power operation (B) compared to the multiple roots, squares, exponential and trigonometric operations encountered in most band models. It also provides an exceptionally

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good fit over a wide range of absorber quantities. This has also been demonstrated by Green and Griggs ("Infrared Transmission Through the Atmosphere" IRIS proceedings).

The coefficient, α , and exponent, B , are obtained by least mean square fits to transmission data. Thus the function may be fitted to either measured or computed data or both. Hence it is versatile in adapting to the best data source at any given wavelength over any defined averaging interval.

In the Fleet Signature work, the function was fitted to the extensive band model predictions of Wyatt, Plass and Stull for CO_2 and H_2O and to measurements of Yates and Taylor for H_2O beyond 10 microns where the Wyatt et al. H_2O data stopped.

The resulting predictions, although relatively coarse spectrally, being approximately 50 cm^{-1} , provided good agreements with transmission measurements by Yates and Taylor and Street over long paths and atmospheric emission measurements by Mooler at large zenith angles. The results of the Fleet Signature Work are reported in "Fleet Signature Model" reported in IRIS proceeding May 1969.

The transmission model was carried over in total and incorporated in the HIDE model. This was of great economical benefit to the HIDE program development.

However, it became apparent in the ensuing HIDE development that the resolution 50 cm^{-1} was too coarse to reproduce the selective plume structure accurately. Thus to remedy this, the work reported on in this volume was initiated to improve the resolution to 5 cm^{-1} .

The exercise was strickly mechanical in that the transmission function and curve fit routine were previously developed and validated in the Fleet

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Signature Study and merely reapplied to the finer resolution data of Wyatt, Plass and Stull. However, this does not mean it was not an arduous task. In fact, the tedium of resurrecting, key punching and proofing 50,000 data values proved to be horrendous.

The results of this improved resolution model are reported in latter sections of this volume. In general, the curve fits to the Wyatt et al. data exhibit an accuracy of less than one percent in most cases. Comparisons are made with all of the available measurements by General Dynamics and Yates and Taylor. For the most part, the spectral structure fits are very good and the magnitudes are on the order of 20% accuracy. This is well within the degree of uncertainty with which the composition of the measured path is known.

However, there are some obvious deficiencies in selected regions such as the slope of the 4.3 micron CO_2 band head and the 5 micron H_2O region. Since the functional fit to the data is good in these cases, the discrepancies have to be attributed to the data base or the measured path attributes.

If the functional fit had been bad, then the algorithm would be questionable as a viable transmission model representation. But if the data base is bad, then it is a simple matter to upgrade the data base.

Upgrading the data base is simple in principle, but is in fact, an arduous task when 5 cm^{-1} resolution is involved. Thus it would not be attempted on a grand scale without the greatest confidence that the new data base was in fact better than the old.

Since the evolution of the implementation of this algorithm from the Fleet Signature Study through the current HIDE development, much work has been done by others in developing and discrediting transmission models and

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measurements. The most publicized of these is the Cambridge Model and a movement is under way to make this the standard transmission model to be used in all radiometric calculations, whatever the form.

This movement is motivated by a desire to standardize transmission models to have a common denominator to compare system performance against. Also, because of the official endorsement of the Cambridge model, it is assumed that it is the most accurate.

These are noble reasons but not necessarily germane to HIDE. The HIDE program is not concerned with relative performance of different systems as much as the absolute performance of specific systems. The transmission model used must be real world accurate and not just academically accurate.

It is no big deal to incorporate the Cambridge or any other model into the HIDE program either in total or via the curve fit function. But it does take time and cost money to implement, and the question unanswered is whether or not it will result in more accurate predictions and if so, will the increased accuracy justify the impact on machine requirements for storage and running time as well as the time delay before exercising the HIDE model to meet current Army needs.

These decisions cannot be made without an in depth validation and comparison of the Cambridge model with the existing HIDE model. This by itself takes time and money to perform.

Thus until a valid case is made and funds provided, the HIDE model will use the previously developed and proven Fleet Signature transmission algorithm with the Wyatt et al. data base which will be periodically upgraded at selected intervals where better agreement can be achieved.

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The work described here shows the degree to which this model fits many measurement data sets. It would be desirable to see comparisons this extensive made with other model candidates. If the Cambridge model is as good as its endorsements, then it would be in the Army's best interest to perform such comparisons with it.

viii

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Table of Contents

	<u>Page</u>
1.0 Introduction	1-1
2.0 Transmission Model	2-1
3.0 Emission Model	3-1
4.0 Bibliography	4-1
Appendix A Atmospheric Transmission Sources	A-1
Appendix B H ₂ O and CO ₂ Transmission Data as used in the "Hide" Program	B-1
Appendix C Atmospheric Validation (General Dynamics)	C-1
Appendix D Yates and Taylor Validation Data	D-1
Appendix E Hot Water Vapor ₁ Emission Data for the Range 50 cm ⁻¹ 9300 cm ⁻¹	E-1
Appendix F Carbon Dioxide Emission Data for the Range 3000-3770 cm ⁻¹	F-1
Appendix G Carbon Dioxide Emission Data for the Range 2050-2500 cm ⁻¹	G-1
Appendix H Carbon Dioxide Emission Data for the Range 500-800 cm ⁻¹	H-1
Appendix I Ludwig ₁ Emission Model for the CO ₂ 1900-2395 cm ⁻¹ Band	I-1
Appendix J Scattering Function	J-1

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1.0 Introduction

This report describes the high resolution atmospheric transmission and exhaust gas emission models to be incorporated into the HIDE (Helicopter Infrared Detection Estimate) computer model.

The HIDE computer model was developed for the Army Aviation System Command, AMCPM-AEWSPS under the technical direction of Steve Smith and is described in a final report titled "Evaluation of IR Countermeasures, Phase II - HIDE Model", dated Feb. 28, 1973.

The work reported here in represents an addendum to the original model where in the spectral resolution has been increased from 50 to 5 cm^{-1} . This was necessary to obtain a more accurate prediction of the exhaust plume spectral signature.

Section 2 describes the empirical equation used to curve fit transmission data and analyzes the goodness of fit to measured data. This equation is

$$\tau = \text{EXP} (-AQ^B)$$

where Q is the quantity of absorber and the coefficient A and exponent B are empirically derived for each wavelength from 1 to 16 microns. The form of the transmission equation allows one to fit either measured data or band model predicted data over a wide range of absorber quantities. Thus it provides a fast machine algorithm with an accuracy commensurate with the accuracy with which Q can be defined. The data used for the fits here were from the extensive band model predictions of Wyatt, Plass and Stull.

Section 3 describes the hot gas emission models now used in HIDE. In this instance the band models defined by the data source were used. The 4.3 micron CO_2 is attributed to Jackson and the entire H_2O and

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remaining CO₂ bands are attributed to Ludwig.

The appendices contain the original input data, the derived coefficients used in the model and comparisons of predictions with measurements.

The exhaust gas prediction-measurement comparisons have been restricted here merely to illustrate the structural fit in order to keep this report unclassified. More detail on the plume spectral fits will be found in a separate unclassified report, titled "Error and Sensitivity Analysis" (u/c), data item 0008 of this contract.

Due to time and funding limitations, the water vapor coefficients beyond 10 microns were not included. This is because the Wyatt, Plass and Stull H₂O data did not go beyond 10 microns. However, the coefficients may be derived from the measurements of Yates and Taylor using the same empirical fit technique. This was done on the original HIDE model and those coefficients are currently used with this high resolution version beyond 10 microns except possessing a 50 cm⁻¹ resolution. However, all of the available Yates and Taylor data is included in this report as is the reduction technique, hence the high resolution coefficients for water vapor beyond 10 microns may be readily derived.

An additional point to note is that an extensive computer optimization process was applied to the Yates and Taylor data (some 9 paths) in an attempt to relate attenuation due to scattering to wavelength, visual range and mixing ratio. The result was that an optimum fit could be obtained for each path but no universal optimum relation could be obtained for all paths that was any better than the original HIDE scattering function.

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$$T_{\text{scat}} = \text{EXP} \frac{2.152 \times \text{PATH LENGTH}}{\text{VISUAL RANGE} \times \text{WAVE LENGTH}}$$

The significance of this is that visual range in itself is not a sufficient descriptor of the particle size or distribution in the path and consequently is responsible for the major prediction errors over long paths at long wave lengths.

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2.0 Transmission Model

The transmission model used in the increased resolution task is basically the same as that used in earlier versions of "Hide" only additional data has been incorporated. The resolution of the new model is between 5 and 10 cm^{-1} for the major gasses CO_2 & H_2O which compares with earlier versions whose transmissions were reported at 105 cm^{-1} to 30 cm^{-1} .

This data is used in a particular function described in the following sections to form a transmission over a given path for each gas. The product of these functions is defined as the atmospheric transmission

$$T = t_1 \times t_2 \dots t_m$$

which in essence is the fractional part of radiation transmitted through the quantities of gas

$$q_1, q_2 \dots q_m$$

found in the path. These gas quantities are dependent upon range, relative humidity, altitude and temperature. The algorithms for obtaining them will not be given in this report as they may be found in

Evaluation of IR Countermeasures

Interim Technical Report

(Model Methodology)

June 26, 1972

The gasses used to form the atmosphere for IR purposes are: $\text{CO}_2, \text{H}_2\text{O}, \text{O}_3, \text{N}_2\text{O}$. That these are indeed the major contributions can be seen from fig. (1) which shows a low resolution solar spectrum and the gasses which form it. The additional gasses shown here have little effect for two reasons

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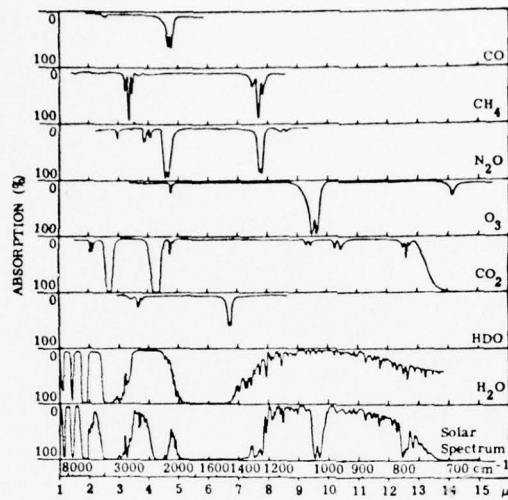


Figure 1. Atmospheric Makeup

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- 1) Path lengths which will be considered by "Hide" are much shorter than those for a solar spectrum measurement and hence the actual absorption is much smaller than shown in fig (1).
- 2) The absorption bands of those gasses not included fall for the most part within other absorption bands and therefore their effect cannot be seen.

2.1 Transmission Equations and Data

The transmission data for water vapor and carbon dioxide was obtained from a report by Wyatt, Plass and Stull under contract No. AF 04 (695)-96 for the Air Force Cambridge Research Laboratories in Bedford, Massachusetts. The reproduction work done on this report was of extremely poor quality as shown in Appendix A, and required a considerable amount of man hours to extract the required data. As can be seen the transmission is listed as a function of wavenumber and quantity of absorber. The resolution as depicted here was averaged over 5 cm^{-1} but recorded at 2.5 cm^{-1} and therefore, the original data was reduced according to an algorithm shown in fig (2). A third order collocation polynomial was used where indicated to interpolate beyond the given accuracy, as in the range 3400 cm^{-1} to 3800 cm^{-1} for H_2O . A complete listing of the reduced data is shown in Appendix B.

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Wave No.	W.P.S. Data	Wave No.	Hide Data
1000	Data Averaged Over 5 cm^{-1}	1000.	Data Extracted at 5 CM^{-1}
3400	Data Reported at 2.5 CM^{-1}	3400	
3400		3400	
	Data Averaged Over 20 CM^{-1}	3800	Data Interpolated to 5 CM^{-1}
	Reported at 10 CM^{-1}	3800	Data Extracted at 10 CM^{-1}
9990		9990	

H₂O DATA USAGE

Wave No.	W.P.S. Data	Wave No.	Hide Data
507	Data Reported at 25 CM^{-1}	507	Data Extracted at 5 CM^{-1}
3800		3800	
3800		3800	
	Data Averaged Over 2.5 CM^{-1} & Reported at 10 CM^{-1}		Data Extracted at 10 CM^{-1}
8600		8600	

CO₂ DATA USAGE

Figure 2. Data Extraction Algorithm

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In the next section a method will be developed to reduce this data even further to an equation of the form

$$T = \text{EXP} (-AQ^B)$$

where:

A, B are constants found in Appendix B

Q = quantity of absorber

This equation is the "Hide" version of transmission for water vapor and carbon dioxide as originally described by Wyatt, Plass and Stull. It is considered superior for mathematical programming purposes as it is fairly easy to evaluate for any quantity of absorber and requires storing only two numbers A & B for each wavelength. The accuracy of this approximation is discussed in section 2.4. The transmission for O_3 and N_2O is given by

$$T = \text{EXP} (-Aq^{.5})$$

where q = quantity of absorber in path.

This is the same equation used in previous versions of "HIDE". The "A" coefficients are reproduced for completeness in Appendix A. These numbers are interpolated down to 5 CM^{-1} for the range $900 - 3800 \text{ CM}^{-1}$ and to 10 CM^{-1} for the range $3800 - 9000 \text{ CM}^{-1}$ using a 3rd order collocation polynomial. The transmission due to scattering is of the form

$$T = \text{EXP} (-A \lambda^{-B})$$

and is described more fully in Section 2.5.

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2.2 H₂O and CO₂ Curve Fits

To interpolate the data in Appendix B between quantities of absorber a curve fit had to be obtained to a proper function. The function which was used and found to be quite satisfactory was of the form:

$$T = \text{EXP}(-Aq^{-B})$$

where A & B are constants dependent on wavelength and q is the quantity of absorber.

To obtain A & B the criteria used was to minimize :

$$S = \sum \text{LN}(T_i/M_i) \quad 2.2.1 \quad \text{for each wavenumber,}$$

where:

M_i = the measured transmission of W.P.S. Appendix B

$$T_i = \text{EXP}(-Aq_i^{-B})$$

This has the tendency to attach equal weights to both small and large numbers as we are actually minimizing a ratio of two numbers rather than the absolute difference as in a least squares routine. Other functions of this ratio of course could have been used such as:

$$S = \sum (1 - T_i/M_i)^2$$

or $S = 1 - \sum (T_i/M_i)^2$ etc. each one of which would have produced

a slightly different curve fit. More investigation into this area probably should be undertaken, as it is 2.2.1 is fairly easily solved for A & B. Upon expansion :

$$S = \sum (A q_i^{-B} + \text{LN}(M_i))^2$$

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setting the derivative to zero we have:

$$\frac{\partial S}{\partial A} = \sum (A q_i^{-B} + \ln(M_i)) q_i^{-B} = 0$$

or

$$A = \frac{-\sum q_i^{-B} \ln(M_i)}{\sum q_i^{-B}} \quad 2.2.2$$

The derivative with respect to B could now be taken, however, this leaves us with a transcendental equation, and it was decided that a more direct approach was advisable. Thus B was varied in a direct search technique, A was then evaluated from 2.2.2 until a minimum value of S was found. A program was written incorporating this technique and exercised on the entire spectrum of W.P.S. data. In addition this routine sorted the data according to fig. (2) and produced a listing and mag tape file in a "HIDE" compatible format. The resultant listing is shown in Appendix B. with the A's and B's shown under their respective column headings.

2.3 Error Measure

The error measure discussed in section 2.2 being non linear has a certain tendency to minimize the ratios of transmission to measured values in a slightly abnormal fashion. That is as the ratio tends toward zero the error blows up much more rapidly than when the ratio becomes larger due to the nature of the natural log. This produces a slight tendency to overestimate the transmission. This effect is so minimal however, as the ratios oscillate about 1, that it takes extremely close observation to notice. On the more positive side this calculation was found to be extremely sensitive to keypunch errors, i.e. large deviation from the exponential curve. Keypunching although just tedious for most jobs

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presented major difficulties in creating this transmission model. The zerox copies from which the data was cut were almost illegible in certain bands; caused in part by the magnification required to make the print large enough to read and partly to blurs in the originals shown in Appendix A. It was decided because of this that the normal validation usually done by the keypunch girl should not even be performed as many interpretations could be made of the same data point. Several other methods, therefore, had to be employed to remove keypunch and other interpretation errors. One device used was to check the values of transmission with increasing absorber quantity, for this function must be monotonically decreasing. This alone uncovered a tremendous amount of errors, however, it was found that an equally sensitive criteria was to observe values of the error function S. Wherever this was found to be large inevitably a keypunch mistake was also uncovered. In some cases this amounted to an error in the third significant digit. Thus, although, it was unexpected the choice of this log function curve fit proved to be very helpful in debugging the W.P.S. data.

2.4 Comparison of Wyatt Plass and Stull with A & B Curve Fits

Fig. (3) shows the results of an exercise to compare some actual data to its respective A, B exponential curve fit. An attempt was made to list a wide range of error values so that a goodness of fit could be determined for any of the curve fits in Appendix B. In this figure the error entered under each actual or measured value is the absolute relative error whereas the error in the last column is the log function described in section 2.2.

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QUANTITY	.001	.002	.005	.010	.020	.050	.100	.200	.500	1.00	2.00	5.00	10.0	20.0	50.0	ERROR
2330. ACTUAL	1.000	.999	.998	.996	.992	.981	.964	.935	.872	.797	.686	.480	.299	.136	.080	
2330. ERROR	.001	.001	.003	.004	.005	.006	.005	.002	.001	.002	.001	.006	.006	.006	.003	.000
2330. CALC	.999	.998	.995	.992	.987	.975	.959	.933	.873	.799	.689	.483	.299	.135	.080	
2450. ACTUAL	1.000	1.000	1.000	1.000	.999	.999	.997	.995	.988	.978	.960	.909	.811	.674	.352	.000
2450. ERROR	.000	.000	.000	.000	.001	.000	.001	.001	.003	.004	.003	.001	.011	.011	.012	.000
2450. CALC	1.000	1.000	1.000	1.000	.999	.999	.998	.996	.991	.982	.963	.907	.820	.667	.353	
2655. ACTUAL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.999	.997	.993	.984	.944	.865	.718	.354	.000
2655. ERROR	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.003	.002	.004	.002	.000	.000
2655. CALC	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.999	.997	.992	.981	.942	.866	.717	.354	
1480. ACTUAL	.935	.886	.791	.691	.556	.331	.162	.047	.002	.000	.000	.000	.000	.000	.000	.010
1480. ERROR	.009	.023	.040	.041	.034	.006	.030	.053	.029	.000	.000	.000	.000	.000	.000	.000
1480. CALC	.943	.906	.822	.720	.575	.333	.157	.045	.002	.000	.000	.000	.000	.000	.000	.010
1620. ACTUAL	.843	.802	.685	.549	.415	.210	.091	.024	.001	.000	.000	.000	.000	.000	.000	.010
1620. ERROR	.027	.031	.030	.032	.031	.021	.020	.061	.028	.000	.000	.000	.000	.000	.000	.000
1620. CALC	.856	.827	.718	.582	.428	.214	.089	.023	.001	.000	.000	.000	.000	.000	.000	.000
2365. ACTUAL	1.000	1.000	.999	.998	.997	.992	.984	.972	.941	.910	.864	.755	.615	.441	.186	.010
2365. ERROR	.000	.000	.000	.000	.000	.001	.005	.009	.020	.022	.021	.020	.032	.077	.029	.000
2365. CALC	1.000	1.000	.999	.998	.997	.993	.989	.980	.959	.930	.882	.770	.635	.453	.182	.010
3635. ACTUAL	.866	.760	.682	.540	.403	.177	.077	.040	.000	.000	.000	.000	.000	.000	.000	.114
3635. ERROR	.054	.044	.068	.070	.083	.121	.257	.142	.000	.000	.000	.000	.000	.000	.000	.000
3635. CALC	.816	.745	.620	.502	.370	.198	.067	.034	.004	.000	.000	.000	.000	.000	.000	.000
3675. ACTUAL	.895	.714	.563	.424	.275	.102	.027	.001	.000	.000	.000	.000	.000	.000	.000	.156
3675. ERROR	.023	.121	.151	.146	.102	.046	.223	.645	.000	.000	.000	.000	.000	.000	.000	.000
3675. CALC	.875	.601	.642	.487	.303	.097	.021	.002	.000	.000	.000	.000	.000	.000	.000	.000
3595. ACTUAL	.741	.697	.562	.401	.267	.109	.036	.003	.000	.000	.000	.000	.000	.000	.000	.400
3595. ERROR	.144	.103	.040	.153	.097	.051	.284	.048	.000	.000	.000	.000	.000	.000	.000	.000
3595. CALC	.848	.769	.616	.462	.293	.103	.027	.003	.000	.000	.000	.000	.000	.000	.000	.000
3640. ACTUAL	.825	.752	.650	.514	.375	.101	.034	.014	.000	.000	.000	.000	.000	.000	.000	.250
3640. ERROR	.025	.037	.107	.132	.196	.312	.276	.169	.000	.000	.000	.000	.000	.000	.000	.000
3640. CALC	.805	.724	.580	.446	.302	.133	.050	.012	.001	.000	.000	.000	.000	.000	.000	.000

Figure 3. Curve Fit Errors

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2.5 Scatter Function

The scattering function for real atmospheres as given in the Handbook of military infrared technology is of the form:

$$T = \text{EXP}(-\alpha \lambda^{-\gamma}) \quad \lambda = \text{wavelength}$$

where α and γ are functions of concentration and size of the scattering particles. These particles could be haze, smog, clouds or water vapor normally found in the atmosphere. The exact dependence is unknown although it is generally recognized that $\gamma = 4$ for very small particles, $\gamma = 2$ for a particle diameter equal to λ , $\gamma = 1$ for a particle diameter equal to $\frac{3}{2}\lambda$, and $\gamma = 0$ when the diameter is equal to 2λ . Since these particle diameters generally are distributed in the infrared region it is not possible to state a scattering function applicable to a wide variety of conditions. It was found that for the Yates and Taylor data used to validate this atmospheric model that γ varied from about .4 to 1.6 with an average value of about 1.0. This is somewhat lower than the sometimes quoted value of 1.3 but the large spread in ambient weather conditions in the Yates and Taylor data could explain this. The value of γ used in the current version of "HIDE" is this average of 1. The value of α used was:

$$= 3.21/\text{VISR}$$

where VISR = visual range in kilometers.

Fig. 4 is a representative plot of a more complete validation exercise found in Appendix D. It is included here as a quick reference to point out the difference between the optimum scattering function derived in Appendix J and the general scattering functions described above. The

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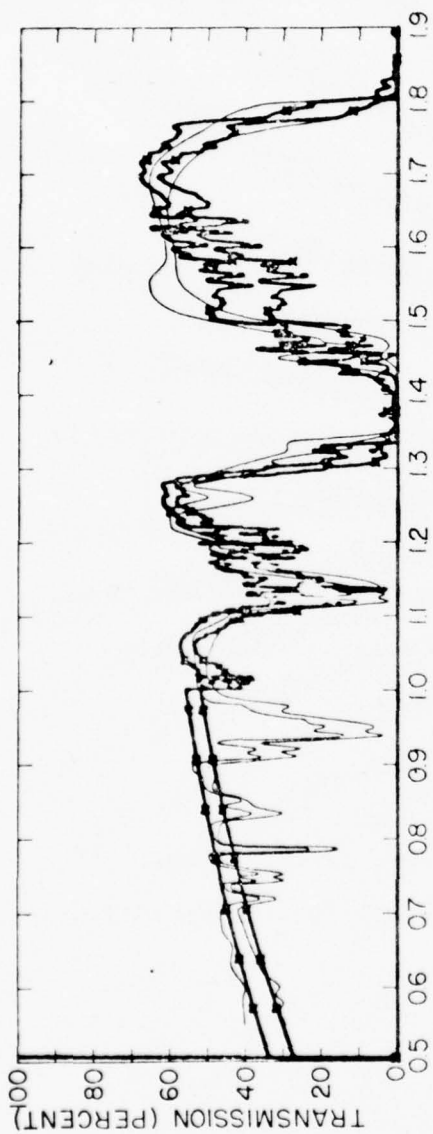


Plate 5 Optimum Scattering

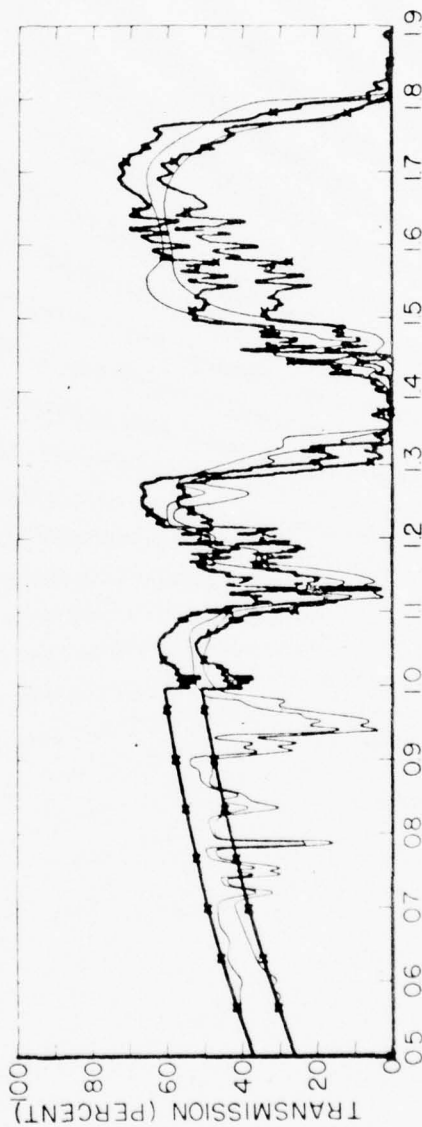


Plate 5 General Scattering

Fig. 4 Optimum and General Scattering for Yates & Taylor

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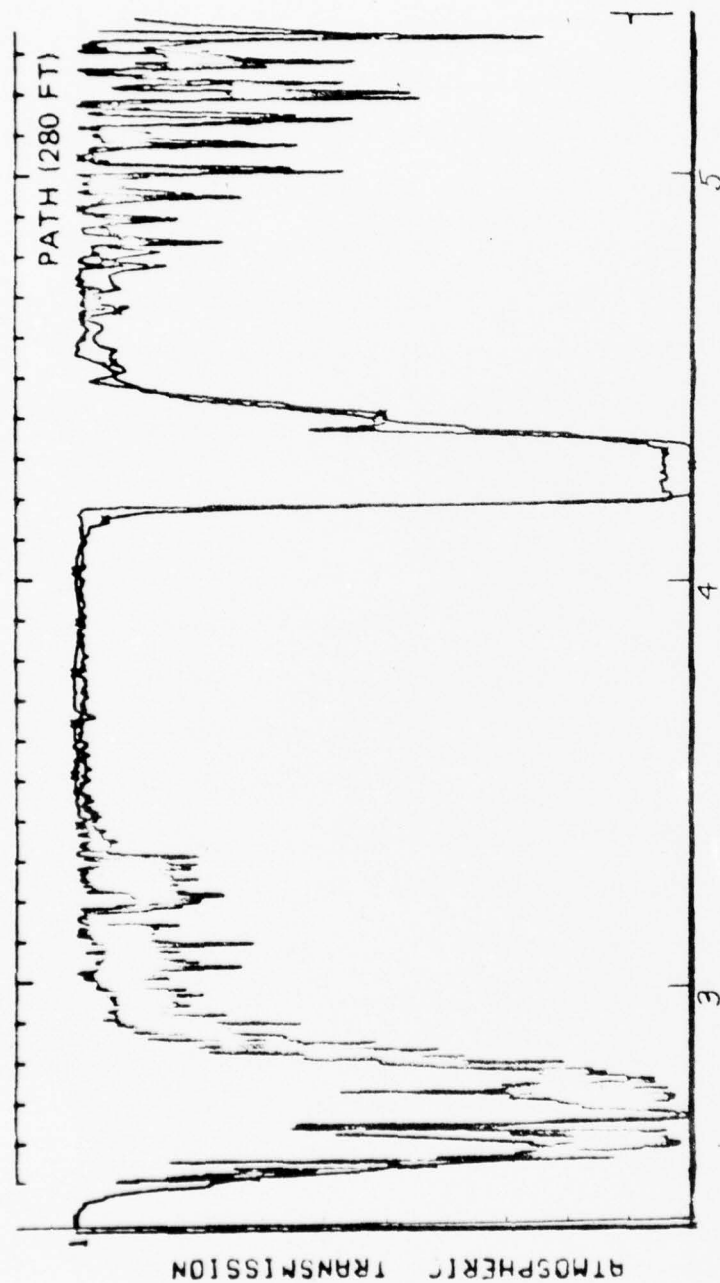
"Hide" model is plotted over top of the validation data (Yates and Taylor) in both cases. It can be seen that there is a definite difference in the two scattering functions and hence that there is an inherent error in the "Hide" transmission model which cannot be corrected at this time as scattering particle distributions are in general never given or unknown. It is felt, however, that the use of $\gamma = 1$ which may be considered as a typical atmosphere will yield minimal errors.

2.6 G.D. Comparisons

In this section the results of an atmospheric model validation study will be presented. The data that was used was recorded from real atmosphere observations by General Dynamics and presented in a report for the Army. It consisted of short ranges from 280 ft. to 6000 ft. under varying meteorological conditions of relative humidity and temperature. The Hide model was used in conjunction with a special plotter program to generate curves of the same spectrum with identical atmospheric parameters. These graphs were run off with small "x's" every .3 inches and were overlayed on top of G.D. A representative plot of this exercise is shown in figure 5 while the complete set of data is shown in Appendix C. A value judgement as to the goodness of fit is very difficult to make here as we have little knowledge about the mean and standard deviation (repeatability) of the G.D. data. Furthermore the scale factor used in such a presentation plays an important role in how good looking the comparisons are and in fact these figures were blown up from the original G.D. report. In spite of these difficulties one observation can be made from this study in favor of the "Hide" model. It can be said quite positively that the model responds properly to varying concentrations of H₂O and carbon dioxide.

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AIR TEMPERATURE: 42°F
RELATIVE HUMIDITY: 27%
PRECIPITABLE H₂O: .19 pr cm/km
ATMOSPHERIC PATH: 280 FT
ALTITUDE: 2281 FT

Figure 5. G.D. Validation Sample

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Since the secondary spike at 4.1μ as well as the entire region from $4.3 - 4.5\mu$ is caused entirely by CO₂ the functional dependence with concentration of this gas can be seen by scanning the figures of appendix C. It appears to be nearly perfect for these ranges. The water vapor dependence is slightly harder to see due to the poor quality of the reproduction, however, the absorption in the dense region from $3-3.5\mu$ is due entirely to H₂O. Although the two curves are almost indistinguishable here, the correct trend can be seen particularly at the longer ranges.

Thus although definite conclusions cannot be drawn from the limited data available some confidence can be obtained in the "Hide" atmosphere from this study.

2.7 Yates and Taylor Data Comparisons

Yates and Taylor at the Naval Research Laboratory in Washington undertook to study and compile data relating to atmospheric transmission in real atmospheres. The data was taken under a wide variety of weather conditions and for extremely long path lengths of from 3.4 to 10.1 statute miles. The results of the study are a series of plates or curves of relatively high resolution extending from $.5\mu$ to 15μ .

For validation purposes the Hide atmospheric model was compared with the Yates and Taylor data and presented in Appendix D.

In Appendix D two sets of curves are presented to show the effects of the optimum best fit scattering functions described in section 2.5 v.s. the general scattering function. The optimum function is decidedly better for all plates except plate 11 where because of the short range scattering is negligible.

In looking at these plates several things should be noted.

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1) The major windows

.94 μ	-	1.13 μ
1.13 μ	-	1.38 μ
1.38 μ	-	1.90 μ
1.9 μ	-	2.7 μ
2.7 μ	-	4.30 μ
4.3 μ	-	6.0 μ
6.0 μ	-	15.0 μ

are well defined and show good agreement between the two models.

- 2) As can be seen from fig. (1) water vapor accounts for most of the strong absorptions in the Yates and Taylor measurements above 10 μ . The Hide model contains no H₂O in this region and thus the bad fits in the high wavelength regions are expected.
 - 3) Although the major gasses have been included in the Hide model there are others present. Some of these along with their major absorption bands are shown in fig. (1).
 - 4) The resolution of N₂O and O₃ shown in Appendix C is relatively low compared with H₂O and CO₂.
 - 5) There could be large fluctuations in gas concentrations along the paths since the distances considered by Yates and Taylor are so long.
- In light of the above remarks the agreement between Hide and Yates and Taylor data is considered to be quite good.

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3.0 EMISSION MODEL

For purposes of computing the emission spectrum, the plume is considered to be composed chiefly of water vapor and carbon dioxide. Knowing the transmissions of these gases, the emission may be computed as:

$$E = 1 - T_{CO_2} * T_{H_2O}$$

These transmissions have been computed as functions of temperature dependent data by Jackson and Ludwig and are summarized in the following sections. For a determination of the accuracy and origin of this emission model Figures 1, 2 should be referred to.

3.1 H₂O Ludwig Transmission Equations

The transmission model of Ludwig is described mathematically as follows:

$$\tau = \exp \left(-\frac{KU}{\sqrt{1 + KU/4A}} \right)$$
$$A = (.5/d) P_t \sqrt{T_0/T} [C (\sqrt{T_0/T} + .1) + .18(1-C)]$$

C = Mole fraction

T = Temp °K

T₀ = Ambient Temp °K

P_t = Total pressure (atmospheres).

d = EXP (-.0016T + 1.21)

U = P_t CL 273/T

L = Path length (CM)

K = Absorption coefficient which is temperature and wavelength dependent and can be found tabulated in Appendix E.

Hide uses a second order collocation polynomial to interpolate between 300°K and 1000°K and a third order polynomial to interpolate between wavenumbers to the desired wavelength.

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WAVE NO.	ORIGINAL DATA		WAVE NO.	HIDE MODEL	
500	Data due to C. B. Ludwig recorded at 5 cm ⁻¹		500	Data extracted at 5 cm ⁻¹ .	
880			880		
	NO DATA TRANSMISSION EQUAL UNITY				
2050	Data due to Jackson recorded at 5 cm ⁻¹		2050	Data extracted at 5 cm ⁻¹ .	
2400			2400		
2400	NO DATA AVAILABLE		2400	Data extrapolated from Jackson 2050 - 2400 data by J. Goodell at 5 cm ⁻¹ .	
2500			2500		
	NO DATA TRANSMISSION EQUAL UNITY				
3000	"K" data due to Ludwig at 10 cm ⁻¹ .	"A" data due to Ludwig at 10 cm ⁻¹	3000	"K" data interpolated	"A" data interpolated down to 5 cm ⁻¹ .
3560			3560		
	"K" data due to Ludwig at 5 cm ⁻¹ .			Data extracted at 5 cm ⁻¹ .	
3770			3770		

Figure 1: CO₂ DATA USAGE

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WAVE NO.	ORIGINAL DATA	WAVE NO.	HIDE MODEL
50	Data due to Ludwig recorded at 25. cm^{-1} .	50	Data interpolated down to 5 cm^{-1} .
		3800	
9300			Data interpolated down to 10 cm^{-1} .
		9300	

Figure 2: H₂O Hot Gas Usage

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An example of the results of this double interpolation is given in Figure 2 which shows the transmission data of H₂O for the temperature range 300°K to 1500°K. This table agrees with Ludwigs data at 300°, 600°, and 1000°K as it must and varies smoothly between these points. The error between this interpolation and the true function "f" at the temperature "T" as given in elementary numerical analysis is:

$$E(T) = \frac{f^{(3)}(\xi)}{3!} (T-300) (T-600) (T-1000)$$

Where $f^{(3)}(\xi)$ is the third derivative of the true transmission at some temperature (ξ) between 300°K and 1000°K.

It is interesting and important to note that this function blows up beyond 1000°K and should not be used as an extrapolation routine here. However, the expected temperatures are below 1000° and will cause no problems.

3.2 CO₂ Ludwig Equations

For the range 3000-3770 cm⁻¹ (500-800 cm⁻¹), the Carbon Dioxide transmission model is due to Ludwig. The equations are:

$$\tau = \exp \left(-KU / \sqrt{1 + KU/4A} \right)$$

$$U = P P_{CO_2} \times P \times PL \times 273/T$$

P = Pressure atmospheres

PPCO₂ = Partial pressure CO₂

PL = Path length

T = temperature °K

A, K are given in tabular form in Appendix F as a function of temperature and wavenumber.

To interpolate between wavenumbers, a third order collocation polynomial is used, whereas temperature interpolations between 300°K and 1200°K are

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H2O TRANSMISSION DATA											
	300.	400.	500.	600.	700.	800.	900.	1000.	1100.	1200.	1500.
2110.	150-02	431-02	730-02	105-01	146-01	178-01	210-01	260-01	305-01	352-01	500-01
2115.	145-02	398-02	676-02	970-02	147-01	166-01	208-01	248-01	288-01	331-01	481-01
2120.	136-02	370-02	624-02	850-02	129-01	154-01	194-01	234-01	274-01	310-01	451-01
2125.	127-02	346-02	587-02	809-02	117-01	146-01	177-01	217-01	257-01	298-01	420-01
2130.	119-02	330-02	561-02	775-02	106-01	134-01	165-01	198-01	238-01	280-01	398-01
2135.	110-02	317-02	530-02	743-02	103-01	120-01	147-01	176-01	216-01	258-01	375-01
2140.	102-02	306-02	520-02	724-02	973-00	122-01	149-01	179-01	219-01	261-01	378-01
2145.	947-03	294-02	500-02	713-02	931-00	116-01	143-01	173-01	213-01	255-01	370-01
2150.	880-03	283-02	479-02	680-02	886-00	109-01	136-01	165-01	205-01	247-01	362-01
2155.	818-03	258-02	438-02	624-02	811-00	101-01	129-01	158-01	198-01	240-01	357-01
2160.	761-03	232-02	395-02	565-02	742-00	925-02	119-01	148-01	188-01	230-01	345-01
2165.	709-03	207-02	352-02	507-02	671-00	845-02	103-01	132-01	172-01	214-01	330-01
2170.	662-03	182-02	310-02	451-02	604-00	770-02	94-00	114-01	154-01	196-01	315-01
2175.	620-03	158-02	272-02	400-02	554-00	704-02	87-00	107-01	147-01	189-01	300-01
2180.	584-03	146-02	250-02	372-02	511-00	667-02	84-00	103-01	143-01	185-01	285-01
2185.	553-03	135-02	233-02	349-02	484-00	637-02	80-00	100-01	140-01	182-01	270-01
2190.	525-03	125-02	218-02	330-02	463-00	613-02	75-00	95-02	137-01	179-01	255-01
2195.	501-03	117-02	205-02	314-02	447-00	592-02	74-00	93-02	135-01	177-01	240-01
2200.	480-03	110-02	193-02	298-02	426-00	572-02	74-00	91-02	133-01	175-01	225-01
2205.	462-03	99-03	174-02	272-02	384-00	536-02	70-00	88-02	131-01	173-01	210-01
2210.	449-03	98-03	156-02	246-02	360-00	498-02	65-00	84-02	128-01	169-01	200-01
2215.	432-03	78-03	138-02	221-02	339-00	460-02	61-00	79-02	126-01	167-01	185-01
2220.	413-03	691-03	121-02	197-02	298-00	423-02	57-00	74-02	124-01	165-01	170-01
2225.	405-03	605-03	106-02	175-02	266-00	387-02	52-00	69-02	122-01	163-01	155-01
2230.	389-03	566-03	971-03	161-02	247-00	356-02	49-00	64-02	120-01	161-01	140-01
2235.	372-03	535-03	902-03	148-02	237-00	327-02	44-00	60-02	118-01	159-01	125-01
2240.	356-03	505-03	847-03	133-02	210-00	301-02	41-00	57-02	116-01	157-01	110-01
2245.	338-03	483-03	790-03	128-02	184-00	277-02	37-00	54-02	114-01	155-01	95-01
2250.	321-03	461-03	754-03	120-02	160-00	255-02	34-00	52-02	112-01	153-01	80-01
2255.	301-03	441-03	677-03	109-02	136-00	237-02	32-00	50-02	110-01	151-01	65-01
2260.	281-03	365-03	601-03	967-03	116-00	221-02	30-00	48-02	108-01	149-01	50-01
2265.	263-03	316-03	527-03	880-03	141-00	208-02	28-00	46-02	106-01	147-01	35-01
2270.	245-03	272-03	457-03	800-03	130-00	196-02	27-00	45-02	104-01	145-01	20-01
2275.	229-03	231-03	395-03	721-03	121-00	186-02	26-00	44-02	102-01	143-01	5-01
2280.	209-03	207-03	357-03	671-03	115-00	179-02	25-00	43-02	100-01	141-01	0-01
2285.	212-03	188-03	327-03	630-03	110-00	173-02	25-00	43-02	100-01	141-01	0-01
2290.	206-03	174-03	304-03	597-03	105-00	167-02	24-00	42-02	98-01	139-01	0-01
2295.	200-03	161-03	286-03	569-03	101-00	161-02	24-00	42-02	98-01	139-01	0-01
2300.	195-03	156-03	273-03	544-03	97-00	155-02	23-00	41-02	96-01	137-01	0-01
2305.	188-03	152-03	258-03	508-03	92-00	144-02	21-00	40-02	94-01	135-01	0-01
2310.	180-03	149-03	246-03	473-03	88-00	131-02	19-00	39-02	92-01	133-01	0-01

Figure 3. Table Obtained by Application of Double Interpolation Formulas to Ludwigs Data in Appendix E.

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accomplished using a second order polynomial. Figure 4 and 5 show some data derived by this interpolation process. The numbers agree at the tabulated as they must and vary smoothly between data points.

3.3 CO_2 Jackson

The CO_2 transmission model used for the range 2050-2400 cm^{-1} is due to Jackson. This model is described as follows:

$$\tau = \text{EXP} \left[\frac{-2\alpha P_t R_k^2}{R_A} \left(\sqrt{1 + (R_a/R_k)^2} L_e/\alpha - 1 \right) \right]$$

Where:

P_t = pressure in atmospheres

$$\alpha = .15 P_t \sqrt{300/T}$$

T = temperature (atmospheres)

$$L_e = 2. \text{PP}_{\text{CO}_2} P_L$$

PP_{CO_2} = Partial pressure

P_L = Path length

R_k and R_A are given in tabular form in Appendix G as a function of temperature and wave number. A third order interpolation routine is used here to interpolate between temperatures. An example of this interpolation is shown in Figures 6, 7.

To obtain data for the range 2400 cm^{-1} to 2500 cm^{-1} an extrapolation procedure due to J. Goodell was used. It consists basically of extrapolating out to 2500 cm^{-1} using a linear function based on end points of the Jackson data. The equations used are:

$$\text{LN}(Y) = \text{LN}(Y)_{2380} + \frac{(\nu - 2380) (\text{LN}(Y)_{2400} - \text{LN}(Y)_{2380})}{2400 - 2380}$$

$$\text{LN}(Y)_{2380} = R_k \text{ or } R_a \text{ at } 2380 \text{ cm}^{-1}$$

$$\text{LN}(Y)_{2400} = R_k \text{ or } R_a \text{ at } 2400 \text{ cm}^{-1}$$

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	300.	400.	500.	600.	700.	800.	900.	1000.	1100.	1200.	1300. CGS K
3420.	.631-07	.325-01	.308-01	.517-02	.754-01	.180-00	.319-00	.492-00	.695-00	.841-00	.187+01
3425.	.127-06	.331-01	.307-01	.711-02	.864-01	.18-00	.333-00	.513-00	.722-00	.879+00	.194+01
3430.	.317-06	.332-01	.300-01	.973-02	.864-01	.18-00	.333-00	.513-00	.722-00	.879+00	.194+01
3435.	.596-06	.349-01	.285-01	.973-02	.864-01	.18-00	.333-00	.513-00	.722-00	.879+00	.194+01
3440.	.113-05	.319-01	.280-01	.132-01	.821-01	.200-00	.348-00	.553-00	.751+00	.105+01	.207+01
3445.	.25-05	.343-01	.280-01	.177-01	.953-01	.230-00	.376-00	.571+00	.804+00	.107+01	.211+01
3450.	.57-05	.249-01	.178-01	.236-01	.108-00	.230-00	.350+00	.526+00	.826+00	.110+01	.215+01
3455.	.105-04	.250-01	.111-01	.311-01	.118-00	.240-00	.350+00	.526+00	.826+00	.110+01	.215+01
3460.	.22-04	.210-01	.111-01	.405-01	.111-00	.260-00	.350+00	.526+00	.826+00	.110+01	.215+01
3465.	.40-04	.151-01	.350-02	.532-01	.146-00	.270-00	.350+00	.526+00	.826+00	.110+01	.215+01
3470.	.621-04	.151-01	.707-02	.666-01	.144-00	.260-00	.350+00	.526+00	.826+00	.110+01	.215+01
3475.	.147-03	.402-02	.190-01	.838-01	.156-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3480.	.28-03	.410-03	.340-01	.132-00	.260-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3485.	.500-03	.312-01	.713-01	.137-00	.260-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3490.	.919-03	.277-01	.973-01	.180-00	.260-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3495.	.245-02	.553-01	.111-00	.207-00	.320-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3500.	.274-02	.553-01	.111-00	.207-00	.320-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3505.	.425-01	.900-01	.161-00	.234-00	.320-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3510.	.751-01	.123-00	.191-00	.254-00	.320-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3515.	.459-01	.125-00	.219-00	.280-00	.320-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3520.	.166-01	.125-00	.219-00	.280-00	.320-00	.320-00	.350+00	.526+00	.826+00	.110+01	.215+01
3525.	.238-01	.148-00	.277-00	.311-00	.511-00	.509+00	.684+00	.826+00	.110+01	.135+01	.259+01
3530.	.406-01	.177-00	.312-00	.448-00	.511-00	.509+00	.684+00	.826+00	.110+01	.135+01	.259+01
3535.	.59-01	.205-00	.335-00	.468-00	.511-00	.509+00	.684+00	.826+00	.110+01	.135+01	.259+01
3540.	.783-01	.253-00	.350-00	.519-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3545.	.103-00	.260-00	.350-00	.519-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3550.	.127-00	.260-00	.350-00	.519-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3555.	.141-00	.260-00	.350-00	.519-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3560.	.159-00	.260-00	.350-00	.519-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3565.	.207-00	.327-00	.411-00	.529-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3570.	.245-00	.357-00	.444-00	.557-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3575.	.215-00	.314-00	.413-00	.576-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3580.	.201-00	.284-00	.371-00	.514-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3585.	.503-00	.366-00	.439-00	.561-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3590.	.414-00	.456-00	.512-00	.561-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3595.	.452-00	.474-00	.513-00	.571-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3600.	.442-00	.446-00	.471-00	.516-00	.619-00	.745+00	.857+00	.954+00	.110+01	.135+01	.259+01
3605.	.347-00	.345-00	.367-00	.412-00	.481-00	.574-00	.619-00	.745+00	.857+00	.954+00	.110+01
3610.	.259-00	.250-00	.268-00	.313-00	.355-00	.463-00	.612+00	.726+00	.897+00	.116+01	.194+01
3615.	.283-00	.251-00	.254-00	.291-00	.325-00	.463-00	.612+00	.726+00	.897+00	.116+01	.194+01
3620.	.337-00	.282-00	.270-00	.291-00	.325-00	.463-00	.612+00	.726+00	.897+00	.116+01	.194+01
3625.	.378-00	.310-00	.288-00	.291-00	.325-00	.463-00	.612+00	.726+00	.897+00	.116+01	.194+01
3630.	.366-00	.321-00	.300-00	.326-00	.368-00	.511+00	.681+00	.826+00	.110+01	.135+01	.259+01

FIGURE 4. TABLE OBTAINED BY APPLICATION OF DOUBLE INTERPOLATION FORMULAS TO LUDWIGS "A" DATA IN APPENDIX F.

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	300.	CC2 300-3770 (K) DATA	400.	500.	600.	700.	800.	900.	1000.	1100.	1200.	1300.CC2 K
3420.	11809	13302	13302	13302	12104	26002	67102	11101	18801	28001	35201	72301
3421.	100	15102	15102	15102	21004	33002	76602	11801	18801	30001	35201	82301
3430.	100	17002	17002	17002	30004	33102	87202	11801	18801	30001	35201	93001
3431.	100	19002	19002	19002	40004	33202	98002	12001	18801	30001	35201	103001
3440.	100	21002	21002	21002	50004	33302	11002	12001	18801	30001	35201	113000
3441.	100	23002	23002	23002	60004	33402	12002	12001	18801	30001	35201	123000
3450.	100	25002	25002	25002	70004	33502	13002	12001	18801	30001	35201	133000
3451.	100	27002	27002	27002	80004	33602	14002	12001	18801	30001	35201	143000
3460.	100	29002	29002	29002	90004	33702	15002	12001	18801	30001	35201	153000
3461.	100	31002	31002	31002	10004	33802	16002	12001	18801	30001	35201	163000
3470.	100	33002	33002	33002	11004	33902	17002	12001	18801	30001	35201	173000
3471.	100	35002	35002	35002	12004	34002	18002	12001	18801	30001	35201	183000
3480.	100	37002	37002	37002	13004	34102	19002	12001	18801	30001	35201	193000
3481.	100	39002	39002	39002	14004	34202	20002	12001	18801	30001	35201	203000
3490.	100	41002	41002	41002	15004	34302	21002	12001	18801	30001	35201	213000
3491.	100	43002	43002	43002	16004	34402	22002	12001	18801	30001	35201	223000
3500.	100	45002	45002	45002	17004	34502	23002	12001	18801	30001	35201	233000
3501.	100	47002	47002	47002	18004	34602	24002	12001	18801	30001	35201	243000
3510.	100	49002	49002	49002	19004	34702	25002	12001	18801	30001	35201	253000
3511.	100	51002	51002	51002	20004	34802	26002	12001	18801	30001	35201	263000
3520.	100	53002	53002	53002	21004	34902	27002	12001	18801	30001	35201	273000
3521.	100	55002	55002	55002	22004	35002	28002	12001	18801	30001	35201	283000
3530.	100	57002	57002	57002	23004	35102	29002	12001	18801	30001	35201	293000
3531.	100	59002	59002	59002	24004	35202	30002	12001	18801	30001	35201	303000
3540.	100	61002	61002	61002	25004	35302	31002	12001	18801	30001	35201	313000
3541.	100	63002	63002	63002	26004	35402	32002	12001	18801	30001	35201	323000
3550.	100	65002	65002	65002	27004	35502	33002	12001	18801	30001	35201	333000
3551.	100	67002	67002	67002	28004	35602	34002	12001	18801	30001	35201	343000
3560.	100	69002	69002	69002	29004	35702	35002	12001	18801	30001	35201	353000
3561.	100	71002	71002	71002	30004	35802	36002	12001	18801	30001	35201	363000
3570.	100	73002	73002	73002	31004	35902	37002	12001	18801	30001	35201	373000
3571.	100	75002	75002	75002	32004	36002	38002	12001	18801	30001	35201	383000
3580.	100	77002	77002	77002	33004	36102	39002	12001	18801	30001	35201	393000
3581.	100	79002	79002	79002	34004	36202	40002	12001	18801	30001	35201	403000
3590.	100	81002	81002	81002	35004	36302	41002	12001	18801	30001	35201	413000
3591.	100	83002	83002	83002	36004	36402	42002	12001	18801	30001	35201	423000
3600.	100	85002	85002	85002	37004	36502	43002	12001	18801	30001	35201	433000
3601.	100	87002	87002	87002	38004	36602	44002	12001	18801	30001	35201	443000
3610.	100	89002	89002	89002	39004	36702	45002	12001	18801	30001	35201	453000
3611.	100	91002	91002	91002	40004	36802	46002	12001	18801	30001	35201	463000
3620.	100	93002	93002	93002	41004	36902	47002	12001	18801	30001	35201	473000
3621.	100	95002	95002	95002	42004	37002	48002	12001	18801	30001	35201	483000
3630.	100	97002	97002	97002	43004	37102	49002	12001	18801	30001	35201	493000
3631.	100	99002	99002	99002	44004	37202	50002	12001	18801	30001	35201	503000
3640.	100	101002	101002	101002	45004	37302	51002	12001	18801	30001	35201	513000
3641.	100	103002	103002	103002	46004	37402	52002	12001	18801	30001	35201	523000
3650.	100	105002	105002	105002	47004	37502	53002	12001	18801	30001	35201	533000
3651.	100	107002	107002	107002	48004	37602	54002	12001	18801	30001	35201	543000
3660.	100	109002	109002	109002	49004	37702	55002	12001	18801	30001	35201	553000
3661.	100	111002	111002	111002	50004	37802	56002	12001	18801	30001	35201	563000
3670.	100	113002	113002	113002	51004	37902	57002	12001	18801	30001	35201	573000
3671.	100	115002	115002	115002	52004	38002	58002	12001	18801	30001	35201	583000
3680.	100	117002	117002	117002	53004	38102	59002	12001	18801	30001	35201	593000
3681.	100	119002	119002	119002	54004	38202	60002	12001	18801	30001	35201	603000
3690.	100	121002	121002	121002	55004	38302	61002	12001	18801	30001	35201	613000
3691.	100	123002	123002	123002	56004	38402	62002	12001	18801	30001	35201	623000
3700.	100	125002	125002	125002	57004	38502	63002	12001	18801	30001	35201	633000
3701.	100	127002	127002	127002	58004	38602	64002	12001	18801	30001	35201	643000
3710.	100	129002	129002	129002	59004	38702	65002	12001	18801	30001	35201	653000
3711.	100	131002	131002	131002	60004	38802	66002	12001	18801	30001	35201	663000
3720.	100	133002	133002	133002	61004	38902	67002	12001	18801	30001	35201	673000
3721.	100	135002	135002	135002	62004	39002	68002	12001	18801	30001	35201	683000
3730.	100	137002	137002	137002	63004	39102	69002	12001	18801	30001	35201	693000
3731.	100	139002	139002	139002	64004	39202	70002	12001	18801	30001	35201	703000
3740.	100	141002	141002	141002	65004	39302	71002	12001	18801	30001	35201	713000
3741.	100	143002	143002	143002	66004	39402	72002	12001	18801	30001	35201	723000
3750.	100	145002	145002	145002	67004	39502	73002	12001	18801	30001	35201	733000
3751.	100	147002	147002	147002	68004	39602	74002	12001	18801	30001	35201	743000
3760.	100	149002	149002	149002	69004	39702	75002	12001	18801	30001	35201	753000
3761.	100	151002	151002	151002	70004	39802	76002	12001	18801	30001	35201	763000
3770.	100	153002	153002	153002	71004	39902	77002	12001	18801	30001	35201	773000
3771.	100	155002	155002	155002	72004	40002	78002	12001	18801	30001	35201	783000
3780.	100	157002	157002	157002	73004	40102	79002	12001	18801	30001	35201	793000
3781.	100	159002	159002	159002	74004	40202	80002	12001	18801	30001	35201	803000
3790.	100	161002	161002	161002	75004	40302	81002	12001	18801	30001	35201	813000
3791.	100	163002	163002	163002	76004	40402	82002	12001	18801	30001	35201	823000
3800.	100	165002	165002	165002	77004	40502	83002	12001	18801	30001	35201	833000
3801.	100	167002	167002	167002	78004	40602	84002	12001	18801	30001	35201	843000
3810.	100	169002	169002	169002	79004	40702	85002	12001	18801	30001	35201	853000
3811.	100	171002	171002	171002	80004	40802	86002	12001	18801	30001	35201	863000
3820.	100	173002	173002	173002	81004	40902	87002	12001	18801	30001	35201	873000
3821.	100	175002	175002	175002	82004	41002	88002	12001	18801	30001	35201	883000
3830.	100	177002	177002	177002	83004	41102	89002	12001	18801	30001	35201	893000
3831.	100	179002	179002	179002	84004	41202	90002	12001	18801	30001	35201	903000
3840.	100	181002	181002	181002	85004	41302	91002	12001	18801	30001	35201	913000
3841.	100	183002	183002	183002	86004	41402	92002	12001	18801	30001	35201	923000
3850.	100	185002	185002	185002	87004	41502	93002	12001	18801	30001	35201	933000
3851.	100	187002	187002	187002	88004	41602	94002	12001	18801	30001	35201	943000
3860.	100	189002	189002	189002	89004	41702	95002	12001	18801	30001	35201	953000
3861.	100	191002	191002	191002	90004	41802	96002	12001	18801	30001	35201	963000
3870.	100	193002										

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2500	2002	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
2501	2003	301	401	501	601	701	801	901	1001	1101	1201	1301	1401	1501	1601	1701	1801	1901	2001
2502	2004	302	402	502	602	702	802	902	1002	1102	1202	1302	1402	1502	1602	1702	1802	1902	2002
2503	2005	303	403	503	603	703	803	903	1003	1103	1203	1303	1403	1503	1603	1703	1803	1903	2003
2504	2006	304	404	504	604	704	804	904	1004	1104	1204	1304	1404	1504	1604	1704	1804	1904	2004
2505	2007	305	405	505	605	705	805	905	1005	1105	1205	1305	1405	1505	1605	1705	1805	1905	2005
2506	2008	306	406	506	606	706	806	906	1006	1106	1206	1306	1406	1506	1606	1706	1806	1906	2006
2507	2009	307	407	507	607	707	807	907	1007	1107	1207	1307	1407	1507	1607	1707	1807	1907	2007
2508	2010	308	408	508	608	708	808	908	1008	1108	1208	1308	1408	1508	1608	1708	1808	1908	2008
2509	2011	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	1609	1709	1809	1909	2009
2510	2012	310	410	510	610	710	810	910	1010	1110	1210	1310	1410	1510	1610	1710	1810	1910	2010
2511	2013	311	411	511	611	711	811	911	1011	1111	1211	1311	1411	1511	1611	1711	1811	1911	2011
2512	2014	312	412	512	612	712	812	912	1012	1112	1212	1312	1412	1512	1612	1712	1812	1912	2012
2513	2015	313	413	513	613	713	813	913	1013	1113	1213	1313	1413	1513	1613	1713	1813	1913	2013
2514	2016	314	414	514	614	714	814	914	1014	1114	1214	1314	1414	1514	1614	1714	1814	1914	2014
2515	2017	315	415	515	615	715	815	915	1015	1115	1215	1315	1415	1515	1615	1715	1815	1915	2015
2516	2018	316	416	516	616	716	816	916	1016	1116	1216	1316	1416	1516	1616	1716	1816	1916	2016
2517	2019	317	417	517	617	717	817	917	1017	1117	1217	1317	1417	1517	1617	1717	1817	1917	2017
2518	2020	318	418	518	618	718	818	918	1018	1118	1218	1318	1418	1518	1618	1718	1818	1918	2018
2519	2021	319	419	519	619	719	819	919	1019	1119	1219	1319	1419	1519	1619	1719	1819	1919	2019
2520	2022	320	420	520	620	720	820	920	1020	1120	1220	1320	1420	1520	1620	1720	1820	1920	2020
2521	2023	321	421	521	621	721	821	921	1021	1121	1221	1321	1421	1521	1621	1721	1821	1921	2021
2522	2024	322	422	522	622	722	822	922	1022	1122	1222	1322	1422	1522	1622	1722	1822	1922	2022

FIGURE 6. TABLE OBTAINED BY APPLICATION OF QUADRATIC INTERPOLATION FORMULA TO JACKSON "A" DATA IN APPENDIX G.

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3.4 Ludwig CO₂ 500-800 cm⁻¹

The transmission model of Ludwig for the range 500-800 cm⁻¹ is given mathematically as follows:

$$\tau = \text{EXP} (-U \cdot K)$$

$$U = (P_{\text{CO}_2}) (P_t) (L) 273/T$$

P_{CO_2} = Partial pressure CO₂

P_t = pressure atmospheres

L = Path length (cm)

T = temperature °K

K = absorption coefficient which is temperature and wavelength dependent and can be found tabulated in appendix H. Hide uses a second order collocation polynomial to interpolate between 300°K and 1200°K, hence, the interpolated numbers agree at the tabulated values and vary smoothly between them as shown in Figure 8.

3.5 Spectra Comparisons

The validation of the emission model was quite difficult as no experimental data was immediately available as in the transmission model, and it is expected that confidence in this program will only be obtained after several valid signatures have been computed. In the plume region 4-5 μ , however, it is possible to make a direct comparison between the emission and transmission models at 300°K. This region is important for the models must match up here or bad estimates will be obtained for the plume prediction. Figures 9-13 represent the results of this study which are considered to be quite good.

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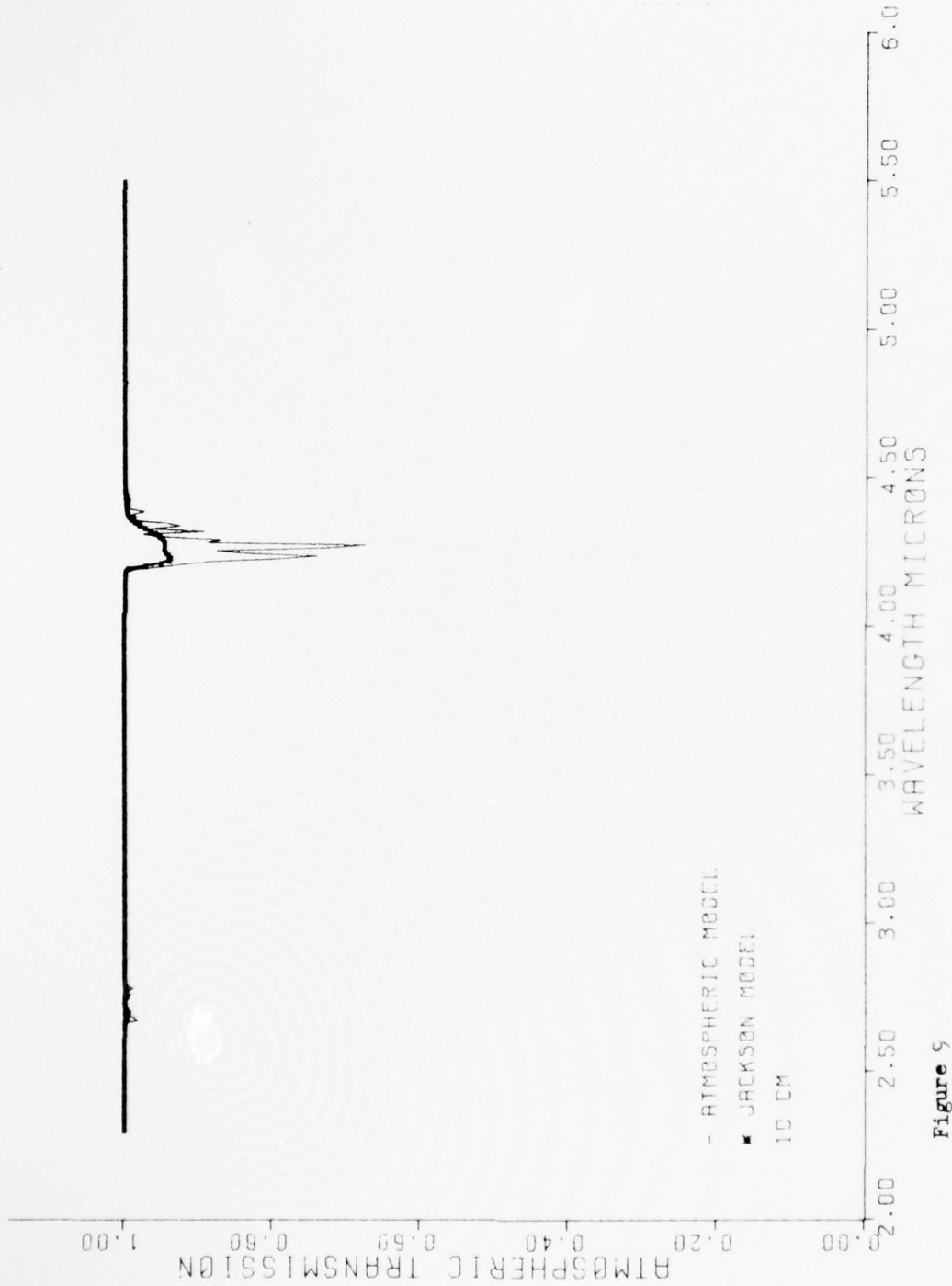


	300.	400.	500.	600.	700.	800.	900.	1000.	1100.	1200.	1500.CEC K
500.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
505.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
510.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
515.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
520.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
525.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
530.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
535.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
540.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
545.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
550.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
555.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
560.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
565.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
570.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
575.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
580.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
585.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
590.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
595.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
600.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
605.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
610.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
615.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
620.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
625.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
630.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
635.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
640.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
645.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
650.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
655.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
660.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
665.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
670.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
675.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
680.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
685.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
690.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
695.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
700.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

FIGURE 8. TABLE OBTAINED BY APPLICATION OF DOUBLE INTERPOLATION FORMULAS TO LUDWIG DATA IN APPENDIX H

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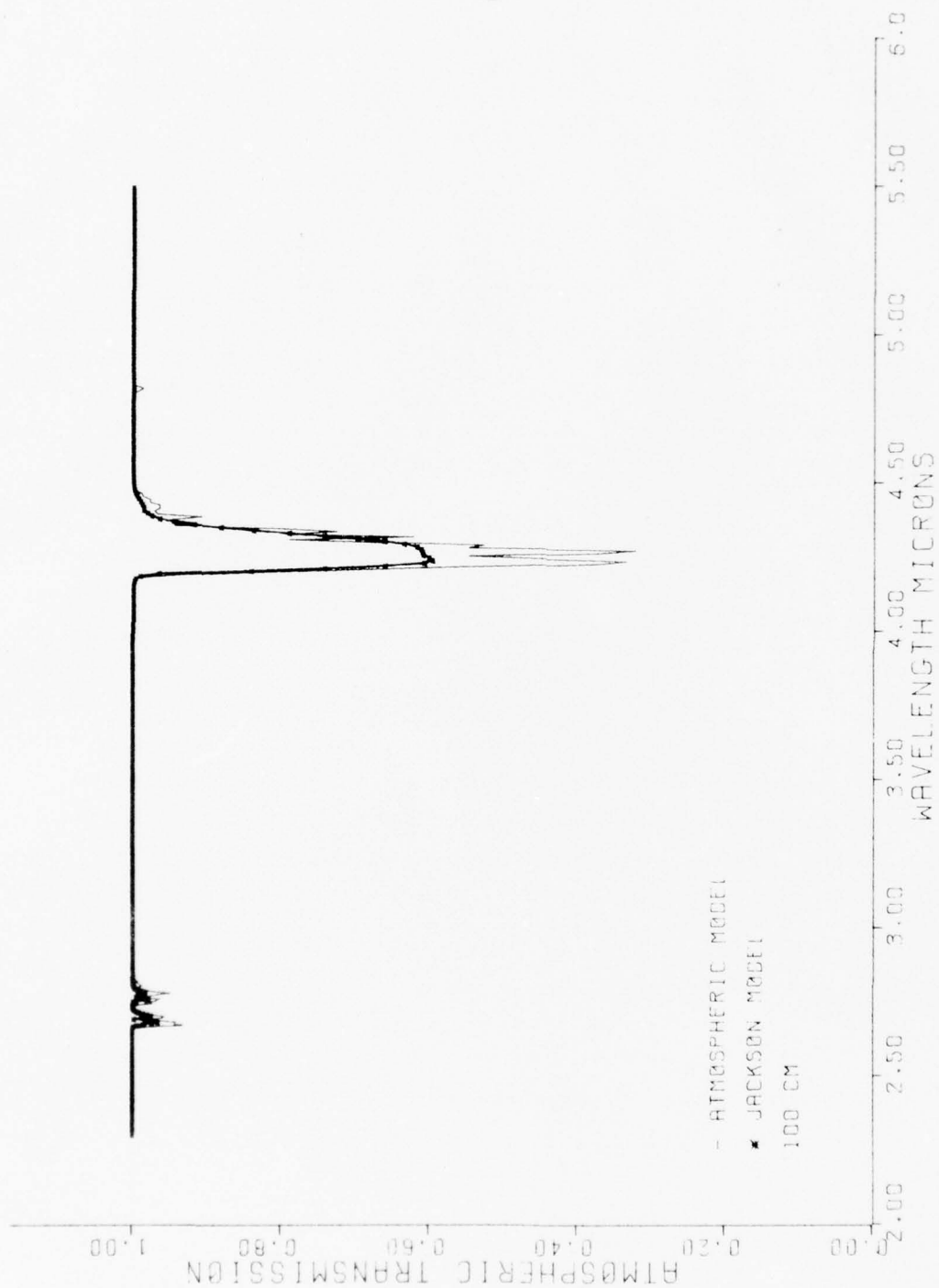


Figure 10

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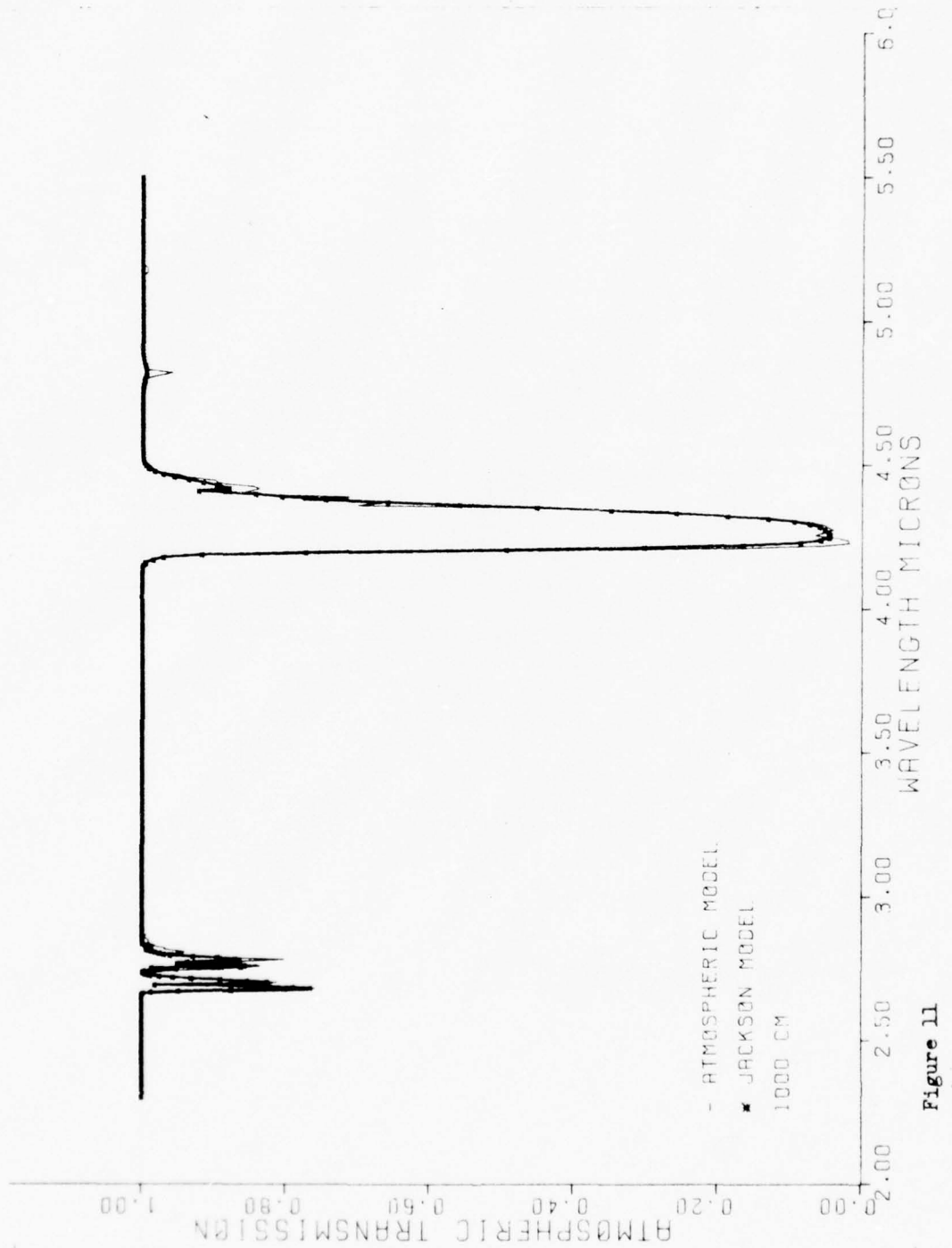


Figure 11

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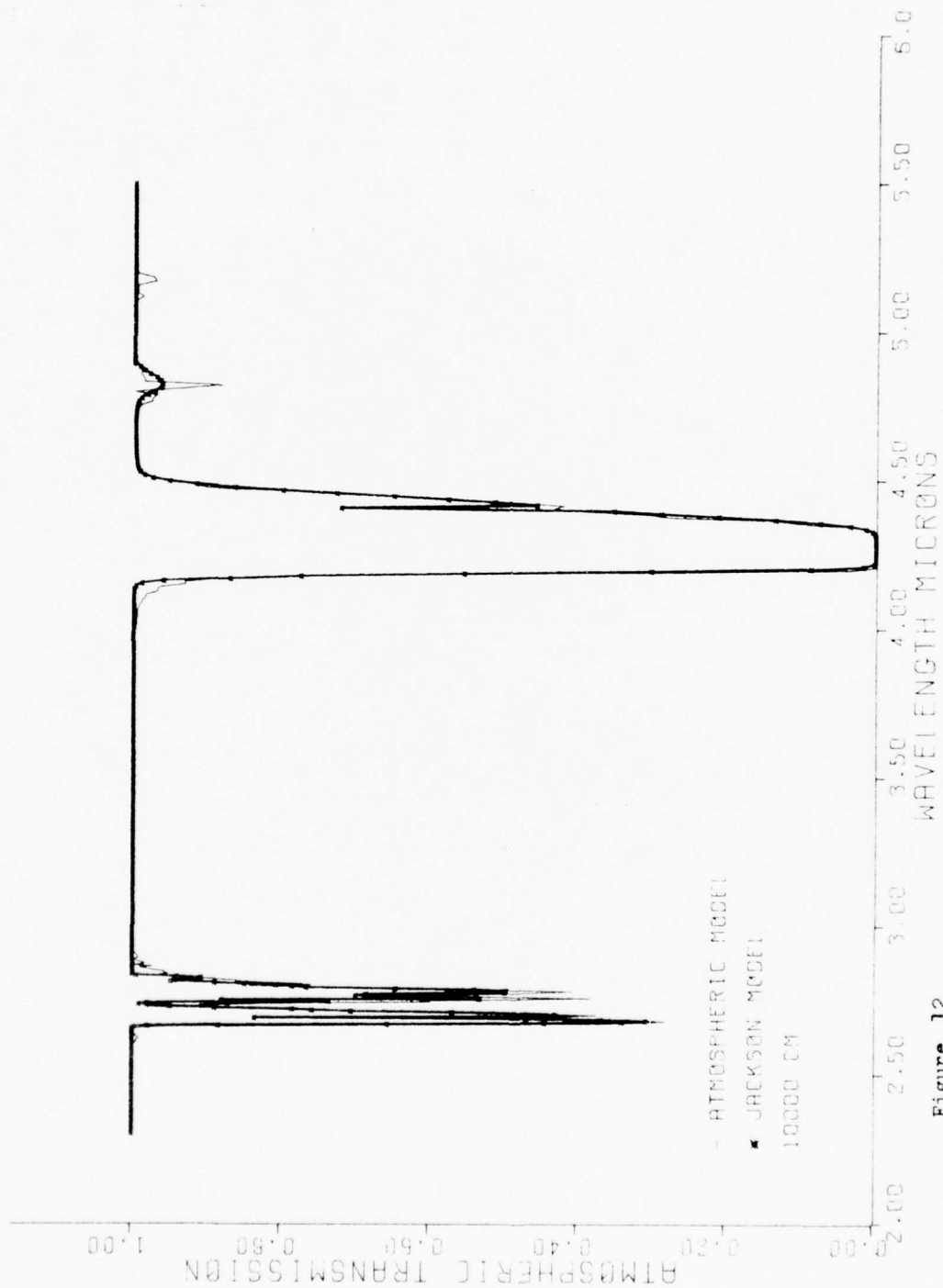


Figure 12

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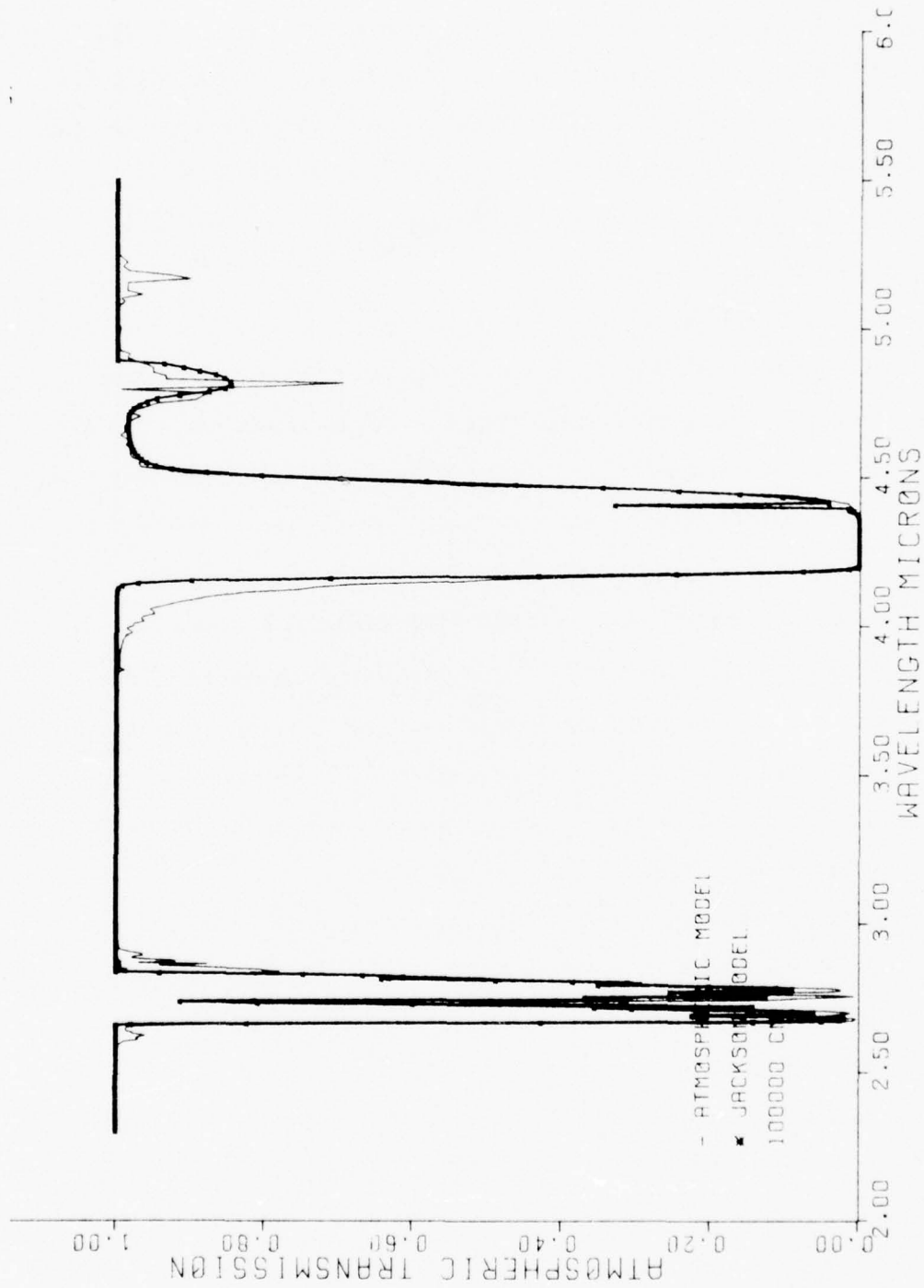


Figure 13

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Another CO₂ emission model has been proposed for this region by Ludwig as shown in Appendix I. This model was also run off against the "HIDE" transmission and is shown in Figures 14-17. Neither model shows an exact match up and the final choice for the "HIDE" model was decided on the basis of the better signature generated which was due to Jackson.

3.6 Plume Radiation Validation

The Infrared Evaluation of a UH1H Helicopter, by General Dynamics, Ref.1, presented the results of some flight tests to measure the radiation from helicopters under varying meteorological and operating conditions. The end product of these tests appears as a series of graphs of Radiant intensity vs. wavelength for various aspect angles. To gain some confidence in the "HIDE" increased resolution models several of the G.D. plots were selected to form a signature and compared directly with the HIDE predictions. Excellent correlation was finally achieved after many iterations and the best of these predictions will be presented in this section. The actual methodology or engineering used to obtain such good validation will be explained in detail in another report on sensitivity and error analysis, Ref. 2, as it illuminates many important facets of the "HIDE" program.

For security reasons, no description of the test conditions, the helicopter, or even the scales of the graphs will be included in this report. This data may be obtained from the G.D. report referenced earlier, Sec. 2.

Figures 18-21 show the results of this study, four spectral plots of Radiant Intensity vs. wavelength for approximately co-altitude look angles of 134°, 196°, 270°, 312° degrees. These angles are measured clockwise looking down on the helicopter with zero degrees being head on. The HIDE output was traced in heavy black ink to make it distant from the G.D. original.

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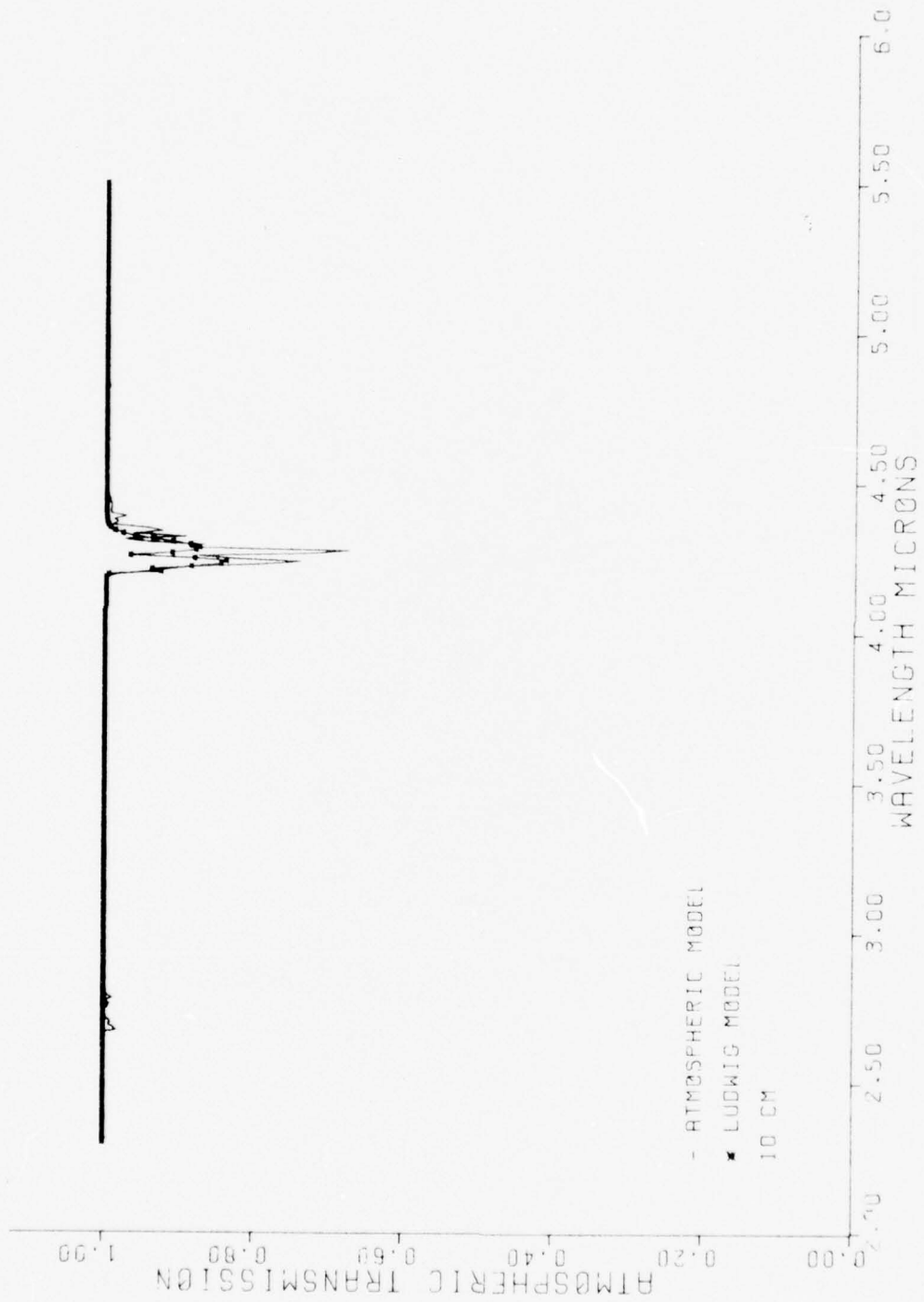


Figure 14

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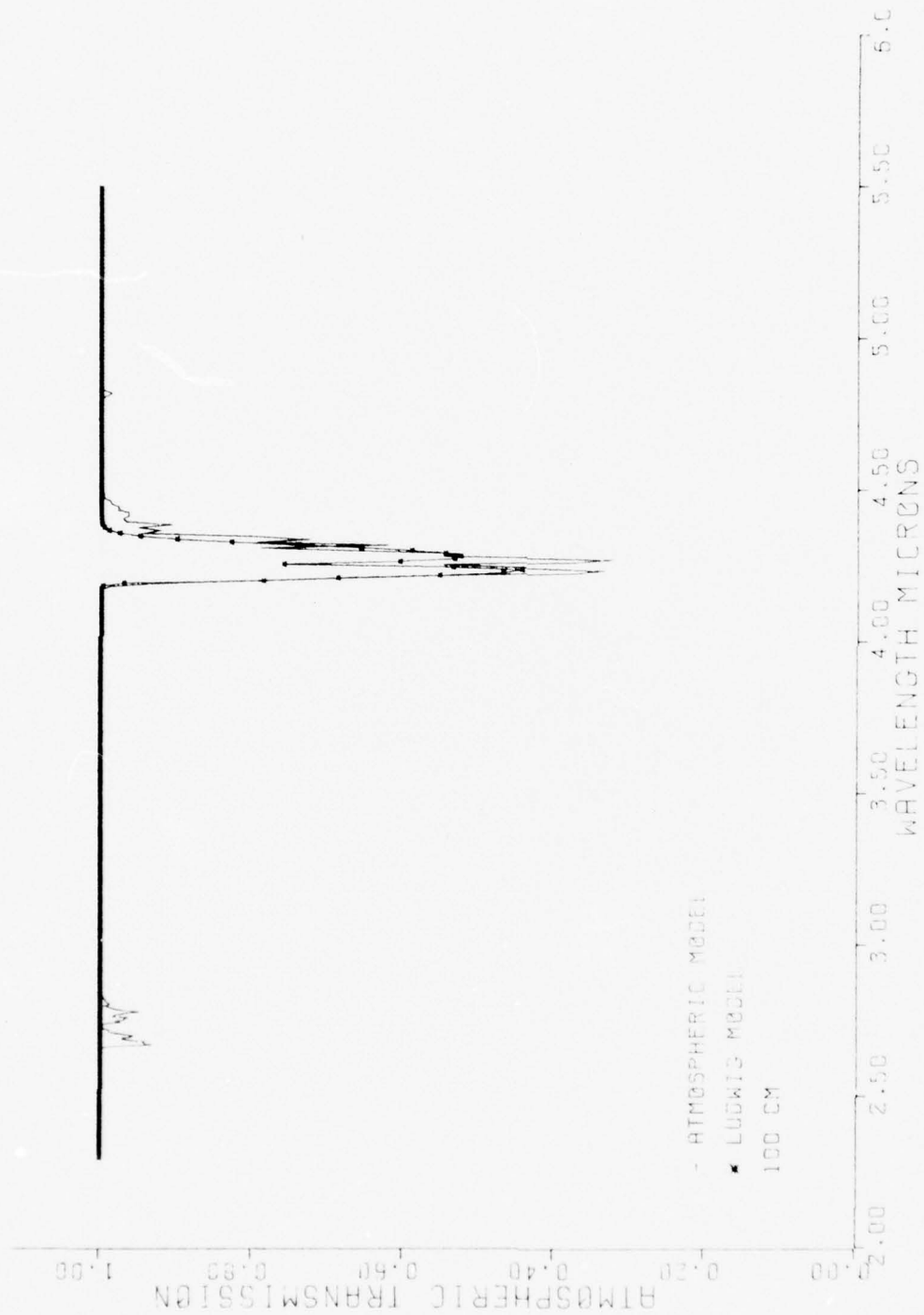


Figure 15

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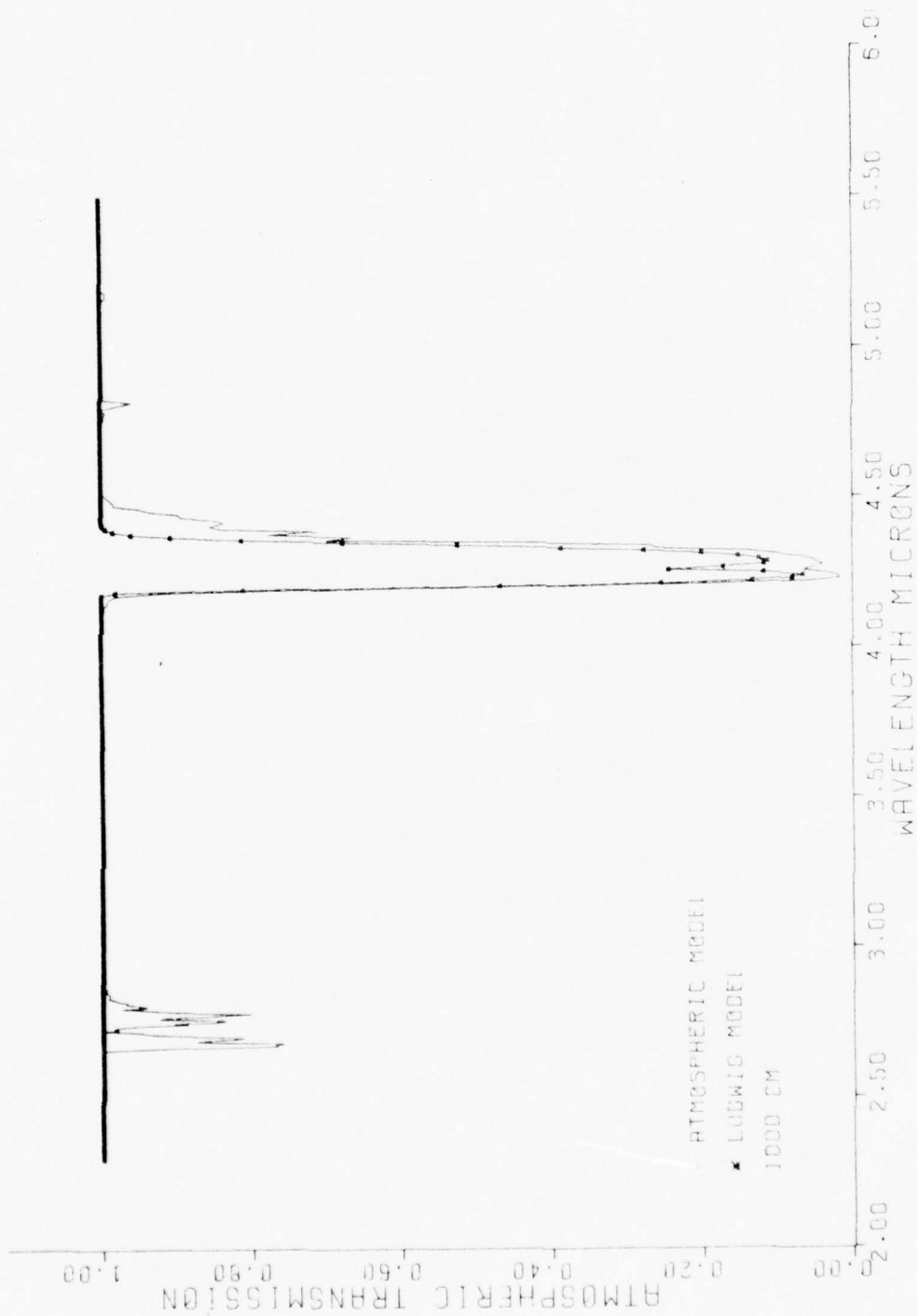


Figure 16

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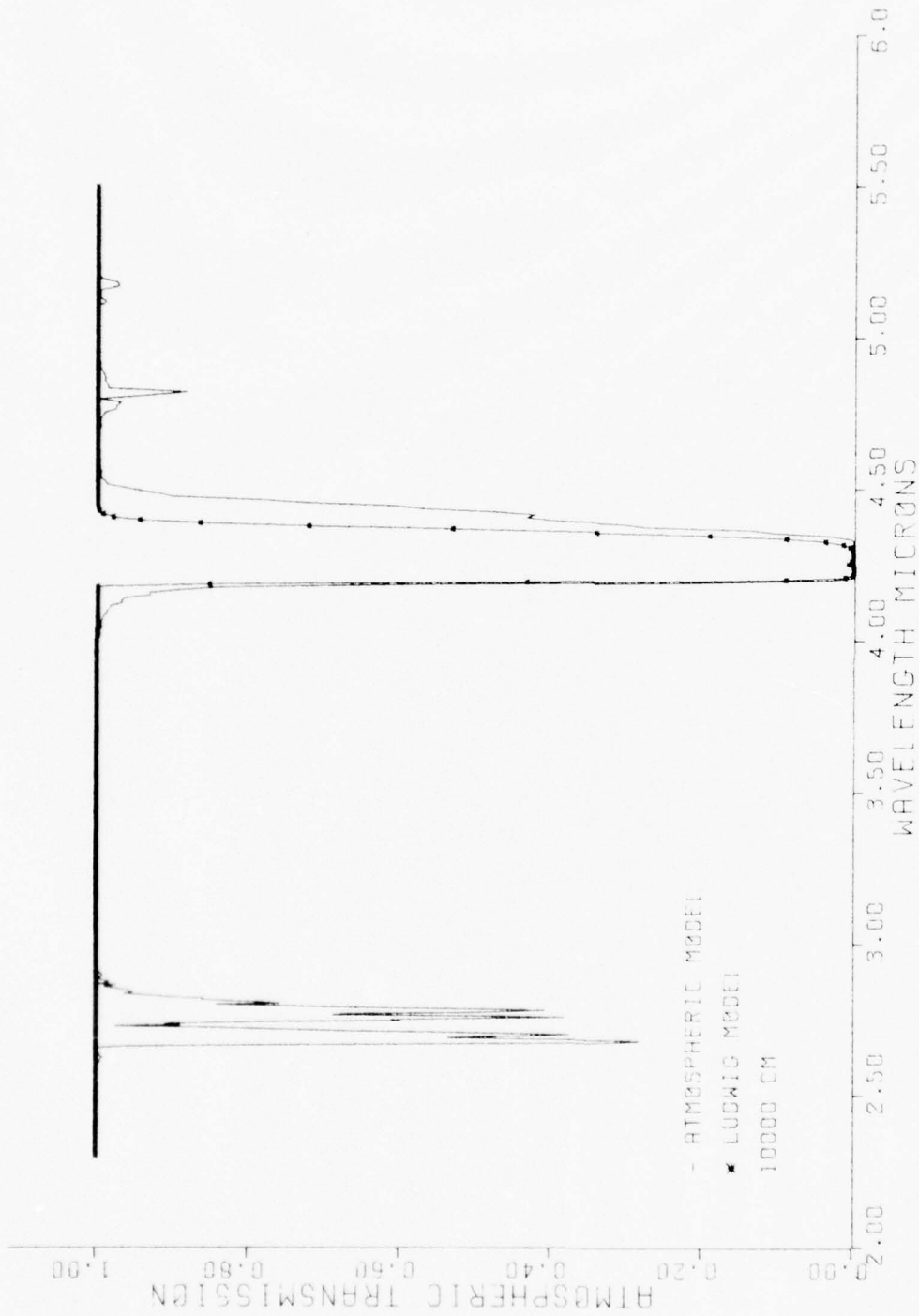


Figure 17

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Although the wavelength band over which the "HIDE" program was exercised is small it represents IR contributions from all the major sources, i.e. tailpipe, boomheating, and plume radiation. In the region about 4.07μ the transmission of water vapor and carbon dioxide is approximately unity, and thus the IR emission from the hot plume gasses must be zero (emissivity = $1. - \text{transmission}$). Hence from 4.05μ to 4.13μ the energy is due purely to the blackbody sources, and when viewed from all aspects a perfect match between measurement and prediction confirms the validity of the mathematical model. The double spikes at 4.2 and 4.4μ represent the IR emission from the hot carbon dioxide in the plume. Two things are of interest here in comparing the measurements and predictions. First of all the structure of the curves (excluding the magnitudes) is important in validating the emission and transmission models. They are widely varying in the region and must complement themselves exactly in order to obtain the proper shape of the radiance. Secondly the energy under these curves represent a good test for the plume velocity and temperature distribution models. Thus it can be seen that figures 18-21 are somewhat favorable to the "HIDE" program. For a more complete validation study the report on Error and Sensitivity analysis of the Hide Program March 1974 should be referred to.

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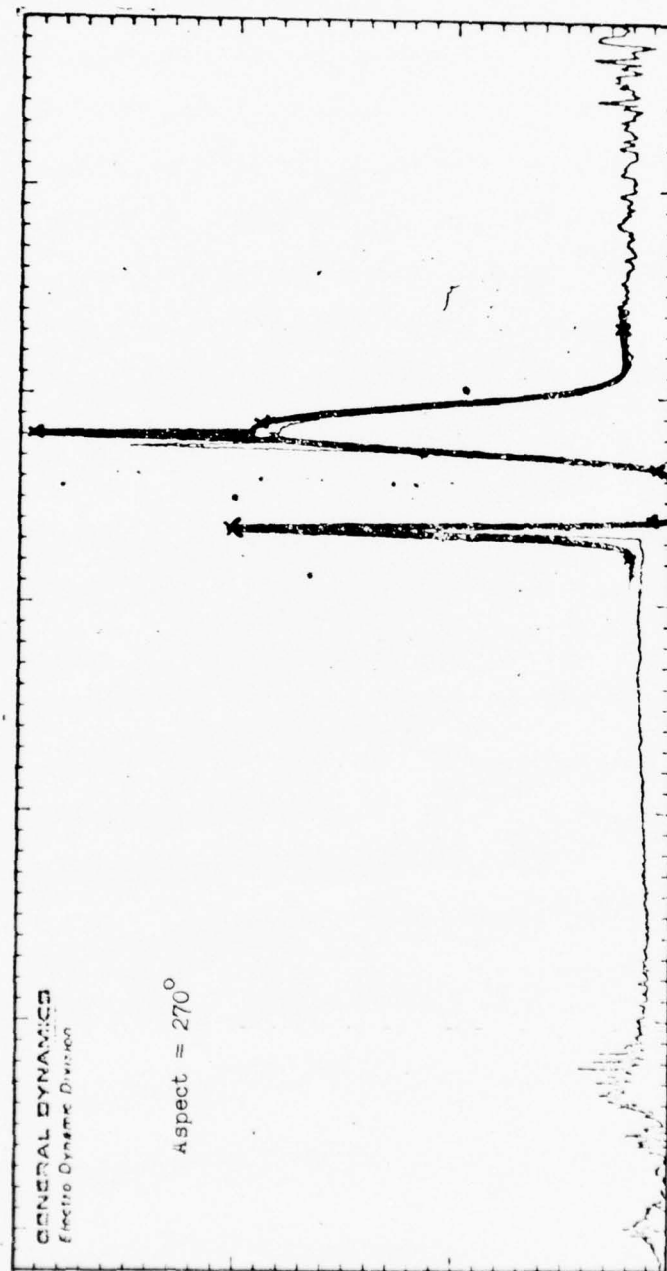


Figure 18 "HIDE" Signature Prediction

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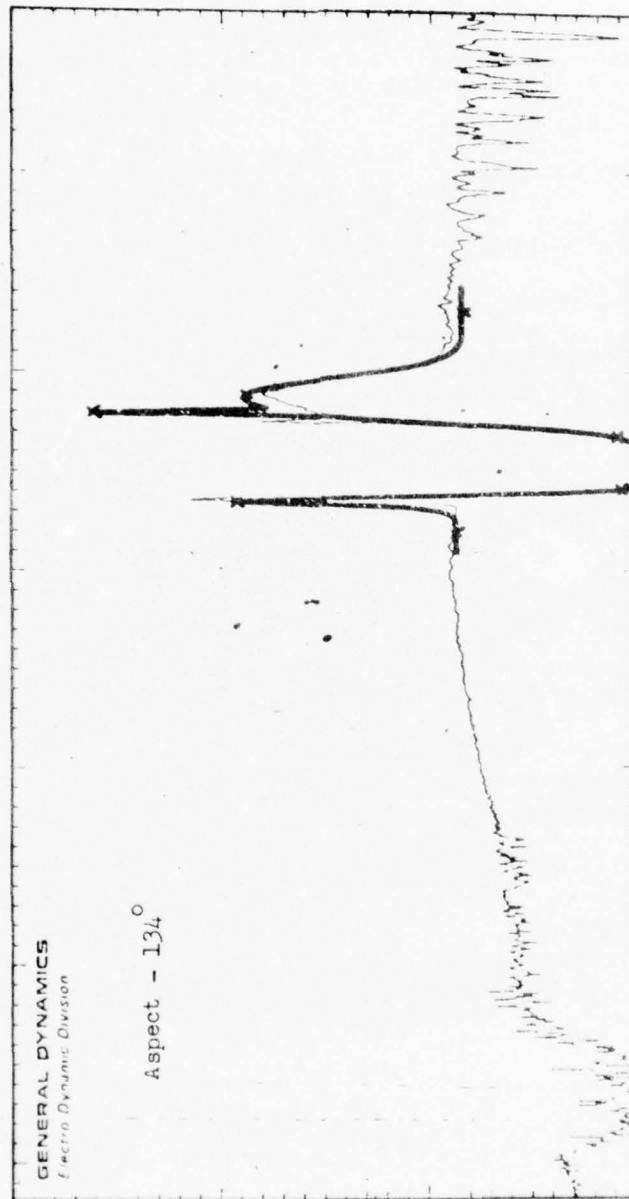


Figure 19 "HIDE" Signature Prediction

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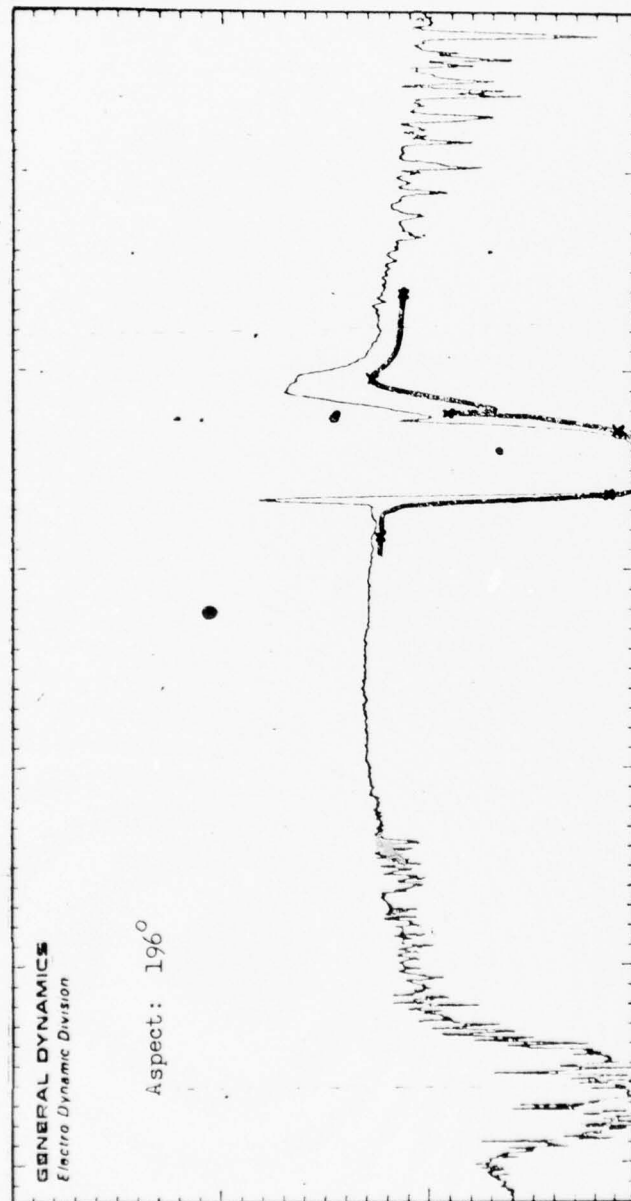
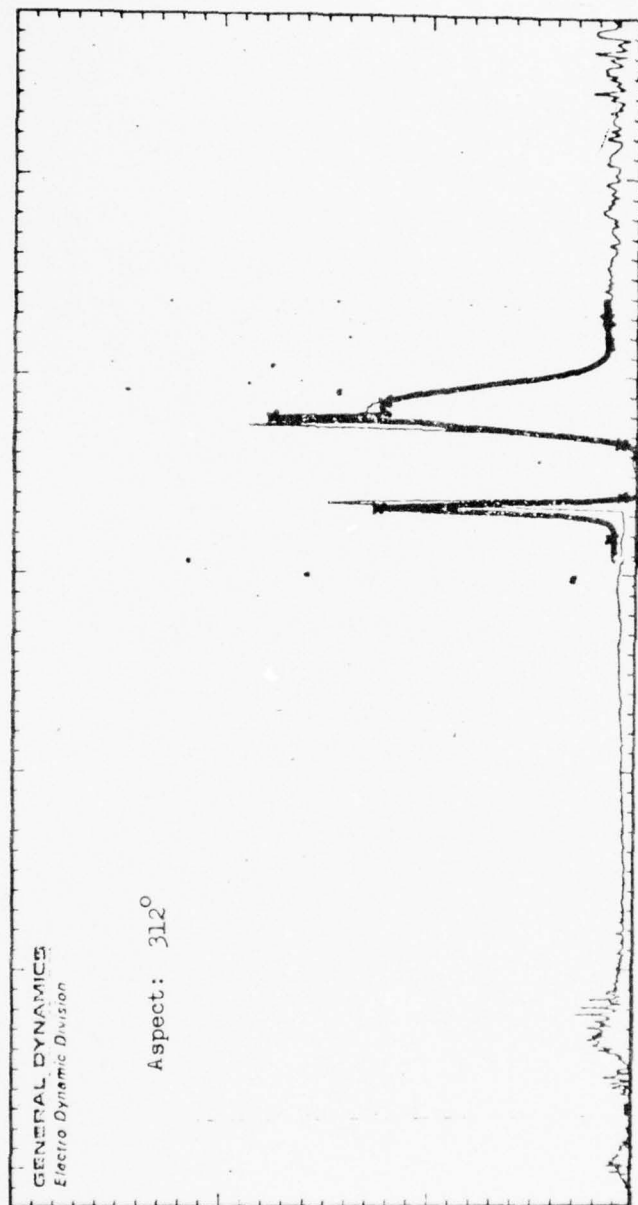


Figure 20 "HIDE" Signature Prediction

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3-27

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4.0 BIBLIOGRAPHY

REF 1 - The Infrared Evaluation of a UH1H Helicopter With & Without
Suppression Vol II Ganett Corporation 1972.

REF 2. Error & Sensitivity Analysis of the "HIDE" - Helicopter Infrared
Simulation. Data Item A008, Addendum to: Evaluation of IR
Countermeasures, Phase II HIDE Model, Final Technical Report
Feb. 28, 1973, Westinghouse Electric Co.

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APPENDIX A

ATMOSPHERIC TRANSMISSION SOURCES

The Infrared Absorption of water vapor, carbon dioxide, ozone and nitrous oxide as compiled for the high resolution transmission model is given in this Appendix. For water vapor and carbon dioxide the actual values of transmission are presented along with the title page of the report from which they were extracted, whereas for O_3 and N_{20} the coefficients A of the transmission equation:

$$T_i = e^{-A_i q}$$

q = quantity of absorber

T = transmission at wavelength i .

are listed.

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SSD-TDR-62-127 - Volume III

INFRARED TRANSMISSION STUDIES

FINAL REPORT, VOLUME III

THE INFRARED ABSORPTION OF CARBON DIOXIDE

V. R. Stull
P. J. Wyatt
G. N. Plass

Contract No. AF 04(695)-96
Project No. 4479-730F
Task No. 447904

as an extension to

Contract No. AF 19(604)-7479

31 January 1963

Prepared for

SPACE SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
Los Angeles, California

as an extension to work sponsored by

GEOPHYSICS RESEARCH DIRECTORATE
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES
Office of Aerospace Research
United States Air Force
Bedford, Massachusetts

AERONAUTRONIC DIVISION
FORD MOTOR COMPANY

Newport Beach, California

A-2

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$T = 300^{\circ}\text{K}$ A-3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	5																																																																														

[illegible]

AVERAGED OVER 20 cm^{-1}

[illegible]

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SSD-TDR-62-127 - Volume II

INFRARED TRANSMISSION STUDIES

FINAL REPORT, VOLUME II

THE INFRARED ABSORPTION OF WATER VAPOR

P. J. Wyatt
V. R. Stull
G. N. Plass

Contract No. AF 04(695)-96
Project No. 4479-730F

as an extension to

Contract No. AF 19(604)-7479
Project No. 4479
Task No. 447904

20 September 1962

Prepared for

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Office of Aerospace Research
United States Air Force
Bedford, Massachusetts

AERONUTRONIC DIVISION
FORD MOTOR COMPANY

Newport Beach, California

A-10

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H2O AT 1.00 Atmosphere

A-11

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H2O AT 1.00 Atmosphere

A-12

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H2O AT 1.00 Atmosphere

A-13

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Table with multiple columns and rows, containing numerical data. The table is divided into sections by headers: "AVERAGED OVER 20 in", "T=300° K", and "H2O AT 1.00 Atmosphere". The data is organized in a grid format, likely representing a thermodynamic property table.

H2O AT 1.00 Atmosphere

A-14

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AVERAGED OVER 20 cm^{-1}

1-300 K

H2O AT 1.00 Atmosphere

A-15

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The following two pages list, for completeness sake, the atmospheric absorption coefficients of O_3 and N_{20} .

These numbers were obtained by curve fitting in the least mean squares sense the data found in: The Handbook of Military Infrared Technology; T.L. Altshuler, "Infrared Transmission and Background Radiation by Clear Atmosphere," General Electric Document, 61SD199 (1961).

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	a_{N_2O}	a_{O_3}		a_{N_2O}	a_{O_3}
1.92	0	0	4.08	0.022199	0
1.96	0	0	4.16	0.012799	0
2	0	0	4.25	0.003499	0
2.04	0	0	4.35	0.011099	0
2.09	0	0	4.44	0.083499	0
2.13	0	0	4.55	0.430999	0.0332
2.17	0	0	4.65	0.019199	0.149
2.22	0	0	4.75	0.174999	0.178
2.27	0	0	4.88	0	0.0825
2.32	0	0	5	0	0.0282
2.38	0	0	5.06	0	0
2.44	0	0	5.12	0	0
2.5	0	0	5.19	0	0
2.57	0	0	5.26	0	0
2.64	0	0	5.33	0	0
2.7	0	0	5.4	0	0
2.78	0	0	5.48	0	0
2.86	0	0	5.56	0	0
2.9	0	0	5.68	0	0
2.94	0	0	5.71	0	0
2.98	0	0	5.79	0	0
3.03	0	0	5.88	0	0
3.08	0	0	5.97	0	0
3.12	0	0	6.06	0	0
3.18	0	0	6.15	0	0
3.22	0	0	6.25	0	0
3.28	0	0	6.35	0	0
3.33	0	0	6.45	0	0
3.39	0	0	6.56	0	0
3.45	0	0	6.67	0	0
3.51	0	0	6.78	0	0
3.57	0	0	6.9	0	0
3.64	0	0	7.02	0	0
3.7	0	0	7.14	0	0
3.78	0	0	7.27	0	0
3.85	0.052099	0	7.4	0	0
3.92	0.072699	0	7.55	0	0
4	0.020199	0	7.7	0.018999	0
			7.85	0.227999	0
			8	0.074699	0

N₂O & O₃ Transmission Coefficients

A-18

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	a_{N_2O}	a_{O_3}
8.16	0.000799	0
8.33	0.001499	0
8.56	0.034599	0
8.7	0.092199	0.0404
8.9	0.094299	0.055
9.1	0.000799	0.104
9.3	0	0.178
9.5	0	0.952
9.7	0	0.915
10	0	0.332
10.3	0	0.0459
10.5	0	0
10.8	0	0
11.1	0	0
11.5	0	0.00041
11.8	0	0.0308
12.2	0	0.00551
12.5	0	0.00771
12.9	0	0.0259
13.3	0	0.0441
13.8	0	0.0405
14.3	0	0.0296
14.8	0	0.0277
15.4	0	0.0145
16	0	0.00639
16.7	0	0.00041
17.4	0	0
18.2	0	0
19.1	0	0
20	0	0

N_{20} & O_3 Transmission Coefficients

A-19

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APPENDIX B

H₂O and CO₂ Transmission Data as Used in
the "Hide" Program

This Appendix presents the water vapor and carbon dioxide data as extracted from Wyatt Plass and Stull, for use in the "Hide" program. The data is listed in tabular form as a function of wavenumber (CM⁻¹) and quantity of absorber. The numbers under columns A and B are the coefficients of the curve fit:

$$T = \exp (-Aq^{-B})$$

as explained in Section 2.2.

B-1

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CARBON DIOXIDE AT 1.00 ATMOSPHERE
T=300 K

FREQ.	10000	5000.	2000.	1000.	500.0	200.0	100.0	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	A	R	ERROR
625.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1448+00	.7100+00	.010
630.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2798+00	.6500+00	.037
635.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3863+00	.6000+00	.009
640.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.4932+00	.7100+00	.000
645.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.6092+00	.6600+00	.010
650.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1029+01	.7300+00	.000
655.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3543+00	.6700+00	.000
660.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7231+00	.6700+00	.010
665.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.4317+00	.7400+00	.006
670.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.8638+00	.5900+00	.176
675.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1732+01	.4800+00	.120
680.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3261+00	.7300+00	.001
685.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.9235+00	.6900+00	.001
690.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1013+01	.7000+00	.006
695.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.8490+00	.7000+00	.005
700.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7100+00	.6400+00	.063
705.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.6024+00	.6800+00	.001
710.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3862+00	.6500+00	.010
715.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2924+00	.7300+00	.028
720.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1438+00	.6400+00	.120
725.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1942+00	.5700+00	.049
730.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.5027+00	.7000+00	.134
735.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.8810-01	.7300+00	.016
740.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.6634-01	.6900+00	.013
745.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.6231-01	.7400+00	.012
750.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.9544-01	.6900+00	.004
755.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.6620-01	.6500+00	.158
760.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.5005-01	.7500+00	.002
765.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1942-01	.6900+00	.031
770.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1755-01	.7600+00	.017
775.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7359-02	.7300+00	.327
780.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7014-02	.7700+00	.375
785.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.5720-02	.8900+00	.135
790.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1054-02	.8900+00	.002
795.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7822-03	.6300+00	.125
800.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1326-01	.7000+00	.005
805.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3656-02	.1010+01	.015
810.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2046-03	.8100+00	.002

B-2

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CARBON DIOXIDE AT 1.00 ATMOSPHERE
T=300 K

FREQ.	10000	5000	2000	1000	500.0	200.0	100.0	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	A	P ERROR
810.	.212	.413	.656	.791	.886	.952	.975	.989	.995	.998	.999	1.000	1.000	1.000	1.000	.8152-03	.8200+00
815.	.260	.467	.706	.828	.911	.964	.982	.992	.997	.998	.999	1.000	1.000	1.000	1.000	.8383-03	.8500+00
820.	.293	.507	.742	.860	.932	.973	.987	.994	.996	.998	.999	1.000	1.000	1.000	1.000	.8397-03	.8900+00
825.	.321	.535	.766	.884	.954	.994	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8405-03	.9200+00
830.	.352	.566	.796	.914	.984	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8411-03	.8700+00
835.	.384	.598	.828	.946	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8417-03	.8100+00
840.	.416	.630	.864	.982	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8423-03	.7300+00
845.	.448	.662	.896	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8429-03	.7400+00
850.	.480	.694	.928	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8435-03	.7500+00
855.	.512	.726	.960	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8441-03	.7600+00
860.	.544	.758	.992	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8447-03	.7700+00
865.	.576	.790	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8453-03	.7800+00
870.	.608	.822	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8459-03	.7900+00
875.	.640	.854	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8465-03	.8000+00
880.	.672	.886	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8471-03	.8100+00
885.	.704	.920	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8477-03	.8200+00
890.	.736	.952	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8483-03	.8300+00
895.	.768	.984	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8489-03	.8400+00
900.	.800	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8495-03	.8500+00
905.	.832	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8501-03	.8600+00
910.	.864	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8507-03	.8700+00
915.	.896	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8513-03	.8800+00
920.	.928	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8519-03	.8900+00
925.	.960	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8525-03	.9000+00
930.	.992	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8531-03	.9100+00
935.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8537-03	.9200+00
940.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8543-03	.9300+00
945.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8549-03	.9400+00
950.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8555-03	.9500+00
955.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8561-03	.9600+00
960.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8567-03	.9700+00
965.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8573-03	.9800+00
970.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8579-03	.9900+00
975.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8585-03	.9999+00
980.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8591-03	.9999+00
985.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8597-03	.9999+00
990.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	.8603-03	.9999+00

B-3

UNCLASSIFIED

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CARBON DIOXIDE AT 1.00 ATMOSPHERE
T=300 K

FRE	10000	5000	2000	1000	500	200	100	50	20	10	5	2	1	0.5	0.2	A	B	FPOR
993	.851	.919	.967	.983	.992	.997	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.2136-04	.5700+00	.000
1003	.887	.940	.977	.988	.994	.997	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.1319-04	.5900+00	.000
1013	.883	.937	.975	.987	.994	.997	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.1646-04	.5700+00	.000
1023	.836	.907	.961	.980	.990	.996	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3836-04	.8300+00	.000
1033	.813	.888	.949	.973	.986	.994	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.7578-04	.8600+00	.000
1043	.783	.848	.924	.958	.978	.991	.995	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.2072-03	.7800+00	.000
1053	.655	.772	.878	.929	.961	.983	.991	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3897-03	.7600+00	.000
1063	.523	.666	.806	.878	.929	.968	.983	.992	.997	.998	.999	1.000	1.000	1.000	1.000	.9448-03	.7100+00	.000
1073	.392	.554	.727	.821	.890	.948	.973	.986	.994	.997	.998	.999	1.000	1.000	1.000	.1638-02	.6900+00	.001
1083	.269	.427	.624	.762	.830	.912	.951	.974	.989	.995	.997	.999	1.000	1.000	1.000	.2177-02	.6700+00	.001
1093	.226	.390	.596	.719	.813	.882	.945	.971	.988	.994	.997	.999	.999	1.000	1.000	.4086-02	.6200+00	.006
1103	.205	.367	.578	.707	.807	.891	.945	.971	.988	.994	.997	.999	.999	1.000	1.000	.3410-02	.6600+00	.001
1113	.276	.443	.651	.775	.864	.936	.966	.982	.993	.996	.998	.999	.999	1.000	1.000	.3321-02	.6700+00	.001
1123	.376	.566	.732	.833	.903	.956	.977	.988	.995	.999	.999	1.000	1.000	1.000	1.000	.1880-02	.7100+00	.002
1133	.213	.373	.576	.781	.801	.897	.943	.970	.987	.994	.997	.999	.999	1.000	1.000	.2508-02	.6600+00	.004
1143	.129	.272	.482	.623	.740	.859	.919	.954	.982	.991	.995	.998	.999	1.000	1.000	.2710-02	.6900+00	.008
1153	.113	.252	.469	.620	.743	.865	.924	.960	.983	.991	.996	.998	.999	1.000	1.000	.5149-02	.6500+00	.002
1163	.134	.298	.502	.656	.781	.893	.942	.979	.985	.994	.997	.999	.999	1.000	1.000	.4569-02	.6700+00	.002
1173	.193	.430	.650	.702	.876	.944	.971	.985	.994	.997	.999	.999	.999	1.000	1.000	.4851-02	.6600+00	.007
1183	.547	.712	.861	.925	.961	.984	.992	.997	.999	.999	.999	1.000	1.000	1.000	1.000	.2168-02	.7000+00	.010
1193	.645	.818	.966	.983	.992	.997	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.2008-03	.8700+00	.000
1203	.974	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3360-05	.1280+01	.001
1213	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.7899-06	.1130+01	.000
1223	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3312-09	.1740+01	.000
1233	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.9401-11	.2000+01	.000
1243	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.9401-11	.2000+01	.000
1253	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1263	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1273	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1283	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1293	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1303	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1313	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1323	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1333	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1343	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1353	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1363	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1373	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1383	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1393	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1403	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1413	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1423	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1433	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1443	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1453	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1463	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1473	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1483	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1493	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000
1503	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01	.000

UNCLASSIFIED

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CAPRON DIOXIDE AT 1.00 ATMOSPHERE												
T=300 K												
FREQ.	10000	5000	2000	1000	500	200	100	50	20	10	5	0.200
1365.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1370.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1374.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1381.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1385.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1391.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1395.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1403.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1411.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1415.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1423.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1425.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1431.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1435.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1443.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1445.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1451.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1453.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1461.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1465.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1471.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1475.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1481.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1485.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1491.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1495.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1503.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1511.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1521.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1525.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1531.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1535.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1541.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1545.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

P ERROR

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

B-6

UNCLASSIFIED

B-7

UNCLASSIFIED

UNCLASSIFIED



CARBON DIOXIDE AT 1.00 ATMOSPHERE

FREQ.	10000	5000	2000	1000	500.0	200.0	100.0	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	A	P	ERROR
1920.	.210	.363	.776	.871	.943	.971	.983	.994	.997	.998	.999	.999	1.000	1.000	1.000	.3076-03	.9300+00	.047
1925.	.411	.586	.710	.850	.920	.963	.982	.991	.996	.998	.999	.999	1.000	1.000	1.000	.1291-02	.7100+00	.005
1930.	.378	.409	.544	.695	.789	.884	.938	.967	.986	.993	.997	.999	.999	1.000	1.000	.1418-01	.4700+00	.089
1935.	.090	.175	.335	.533	.684	.788	.886	.936	.974	.987	.993	.997	.999	.999	1.000	.1557-01	.5500+00	.050
1940.	.368	.544	.738	.834	.867	.939	.974	.989	.994	.998	.999	.999	1.000	1.000	1.000	.1317-02	.7200+00	.001
1945.	.423	.585	.756	.844	.868	.958	.972	.989	.993	.998	.999	.999	1.000	1.000	1.000	.1250-02	.7100+00	.000
1950.	.448	.606	.770	.858	.815	.868	.980	.990	.996	.998	.999	.999	1.000	1.000	1.000	.1066-02	.7200+00	.001
1955.	.567	.651	.663	.826	.814	.821	.989	.992	.997	.998	.999	.999	1.000	1.000	1.000	.6625-02	.4600+00	.028
1960.	.601	.735	.881	.926	.858	.885	.991	.995	.998	.999	.999	.999	1.000	1.000	1.000	.5237-03	.8000+00	.001
1965.	.668	.783	.803	.956	.871	.880	.985	.998	.999	.999	.999	.999	1.000	1.000	1.000	.1169-02	.6400+00	.001
1970.	.763	.830	.927	.971	.883	.894	.997	.998	.999	.999	.999	.999	1.000	1.000	1.000	.1772-03	.6000+00	.000
1975.	.761	.871	.951	.984	.893	.897	.998	.999	.999	.999	.999	.999	1.000	1.000	1.000	.1584-04	.1060+01	.000
1980.	.769	.873	.955	.989	.893	.898	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	.1394-04	.1070+01	.000
1985.	.767	.877	.953	.987	.895	.898	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	.1167-04	.1090+01	.000
1990.	.748	.865	.947	.983	.894	.894	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	.1535-04	.1070+01	.000
1995.	.737	.859	.944	.962	.894	.894	.999	.999	.999	.999	.999	.999	1.000	1.000	1.000	.2744-04	.1010+01	.000
2000.	.619	.722	.839	.957	.882	.893	.996	.998	.999	.999	.999	.999	1.000	1.000	1.000	.3746-03	.7800+00	.006
2005.	.469	.644	.834	.925	.867	.887	.993	.997	.999	.999	.999	.999	1.000	1.000	1.000	.1760-03	.9100+00	.002
2010.	.664	.815	.925	.967	.892	.897	.998	.999	.999	.999	.999	.999	1.000	1.000	1.000	.2590-04	.1050+01	.000
2015.	.613	.779	.908	.957	.887	.895	.997	.999	.999	.999	.999	.999	1.000	1.000	1.000	.8094-04	.1020+01	.000
2020.	.542	.728	.882	.944	.881	.892	.996	.998	.999	.999	.999	.999	1.000	1.000	1.000	.6165-04	.1000+01	.000
2025.	.491	.692	.864	.935	.878	.891	.995	.998	.999	.999	.999	.999	1.000	1.000	1.000	.7156-04	.1000+01	.000
2030.	.436	.650	.842	.922	.841	.869	.994	.997	.999	.999	.999	.999	1.000	1.000	1.000	.1201-03	.9600+00	.001
2035.	.193	.365	.622	.779	.887	.934	.976	.988	.995	.999	.999	.999	1.000	1.000	1.000	.1152-02	.7900+00	.005
2040.	.159	.372	.621	.771	.879	.949	.974	.987	.995	.999	.999	.999	1.000	1.000	1.000	.6650-03	.8600+00	.001
2045.	.147	.311	.553	.707	.820	.921	.957	.978	.991	.995	.999	.999	1.000	1.000	1.000	.1931-02	.7500+00	.002
2050.	.031	.132	.368	.552	.709	.849	.914	.953	.980	.990	.995	.999	.999	1.000	1.000	.2844-02	.7700+00	.001
2055.	.035	.138	.358	.529	.676	.816	.888	.937	.973	.986	.991	.996	.999	.999	1.000	.4012-02	.7300+00	.002
2060.	.022	.104	.363	.480	.640	.792	.870	.924	.966	.983	.991	.996	.999	.999	1.000	.3475-02	.7600+00	.004
2065.	.012	.075	.284	.439	.598	.765	.850	.912	.961	.980	.990	.996	.999	.999	1.000	.8294-02	.7300+00	.008
2070.	.014	.084	.298	.466	.597	.763	.849	.934	.972	.986	.993	.997	.999	.999	1.000	.8547-02	.7200+00	.156
2075.	.005	.030	.104	.170	.238	.353	.412	.516	.792	.883	.937	.974	.993	.997	.999	.7420-01	.4600+00	.276
2080.	.000	.037	.137	.204	.404	.558	.663	.706	.878	.939	.964	.989	.998	.999	.999	.3628-01	.5300+00	.056
2085.	.000	.002	.246	.427	.593	.766	.832	.914	.961	.980	.990	.996	.999	.999	.999	.3452-04	.1420+01	.287
2090.	.000	.049	.177	.324	.486	.686	.794	.820	.860	.975	.987	.993	.999	.999	.999	.1539-01	.6200+00	.009
2095.	.000	.025	.204	.406	.634	.774	.868	.941	.969	.984	.994	.997	.998	.999	.999	.1195-01	.6700+00	.226
2100.	.011	.012	.263	.448	.618	.793	.878	.931	.978	.985	.992	.993	.999	.999	.999	.1154-01	.6600+00	2.151

B-9

UNCLASSIFIED

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CARBON DIOXIDE AT 1.00 ATMOSPHERE															
T=300 K															
FREQ.	1000	5000	2000.	1000.	500.0	200.0	100.0	50.0	20.0	10.0	5.000	2.000	1.000	0.500	0.200
2105.	.011	.069	.261	.453	.636	.814	.889	.943	.977	.988	.994	.998	.999	.999	1.000
2110.	.023	.108	.334	.535	.712	.879	.937	.967	.987	.993	.997	.998	.999	.999	1.000
2115.	.030	.134	.416	.622	.761	.900	.941	.968	.982	.986	.989	.991	.993	.993	1.000
2120.	.053	.197	.492	.692	.830	.933	.978	.983	.995	.999	.999	.999	1.000	1.000	1.000
2125.	.057	.130	.400	.606	.784	.898	.937	.959	.981	.986	.989	.991	.993	.993	1.000
2130.	.014	.127	.341	.534	.703	.857	.938	.978	.984	.989	.994	.997	.999	1.000	1.000
2135.	.090	.223	.588	.768	.878	.954	.987	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000
2140.	.063	.236	.545	.734	.858	.945	.972	.983	.988	.999	1.000	1.000	1.000	1.000	1.000
2145.	.048	.206	.531	.784	.844	.939	.977	.984	.988	.999	1.000	1.000	1.000	1.000	1.000
2150.	.041	.194	.508	.715	.847	.941	.974	.986	.988	.999	1.000	1.000	1.000	1.000	1.000
2155.	.032	.274	.482	.705	.844	.936	.972	.977	.999	.999	1.000	1.000	1.000	1.000	1.000
2160.	.025	.157	.476	.675	.819	.930	.969	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2165.	.017	.100	.444	.669	.829	.930	.966	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000
2170.	.013	.113	.470	.650	.815	.925	.962	.990	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2175.	.008	.088	.300	.619	.773	.915	.957	.985	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2180.	.004	.065	.336	.541	.748	.885	.960	.981	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2185.	.002	.046	.290	.540	.839	.894	.960	.971	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2190.	.001	.029	.244	.495	.700	.860	.931	.978	.999	1.000	1.000	1.000	1.000	1.000	1.000
2195.	.001	.017	.145	.443	.658	.881	.931	.966	.997	.998	.999	.999	.999	.999	1.000
2200.	.000	.000	.146	.382	.621	.835	.918	.965	.997	.998	.999	.999	.999	.999	1.000
2205.	.000	.003	.095	.365	.553	.887	.889	.934	.997	.998	.999	.999	.999	.999	1.000
2210.	.000	.001	.044	.284	.444	.725	.880	.933	.983	.997	.998	.999	.999	.999	1.000
2215.	.000	.000	.014	.103	.302	.608	.734	.892	.964	.988	.994	.998	.999	.999	1.000
2220.	.000	.000	.004	.045	.112	.476	.658	.825	.864	.975	.987	.993	.997	.999	1.000
2225.	.000	.000	.001	.012	.080	.103	.520	.710	.874	.942	.974	.987	.993	.999	1.000
2230.	.000	.000	.000	.002	.023	.149	.328	.529	.785	.886	.932	.977	.998	.999	1.000
2235.	.000	.000	.000	.000	.003	.056	.172	.551	.606	.760	.884	.932	.977	.985	1.000
2240.	.000	.000	.000	.000	.001	.020	.069	.228	.475	.854	.994	.996	.998	.999	1.000
2245.	.000	.000	.000	.000	.000	.003	.028	.108	.310	.693	.668	.821	.864	.975	1.000
2250.	.000	.000	.000	.000	.000	.000	.008	.032	.203	.373	.544	.740	.841	.910	1.000
2255.	.000	.000	.000	.000	.000	.000	.002	.022	.133	.287	.446	.672	.783	.850	1.000
2260.	.000	.000	.000	.000	.000	.000	.000	.001	.095	.224	.401	.613	.741	.833	1.000
2265.	.000	.000	.000	.000	.000	.000	.000	.000	.004	.036	.167	.335	.588	.776	1.000
2270.	.000	.000	.000	.000	.000	.000	.000	.000	.002	.042	.149	.314	.541	.750	1.000
2275.	.000	.000	.000	.000	.000	.000	.000	.000	.001	.023	.132	.291	.523	.787	1.000
2280.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.008	.019	.241	.581	.776	1.000
2285.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.009	.052	.163	.402	.763	1.000

.002
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 .142
 .382
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 .150
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 .152
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 1.173
 .015

B-10

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CARBON DIOXIDE AT 1.00 ATMOSPHERE															A		R ERROR	
PRE.	1000	500	200	100	50	20	10	5	2	1	0.5	0.2	0.1	0.05	A	R	ERROR	
2293.	.000	.000	.000	.000	.000	.000	.001	.011	.042	.238	.626	.812	.991	.991	.8945+00	.6900+00	.632	
2295.	.000	.000	.000	.000	.000	.000	.000	.003	.074	.423	.383	.671	.794	.794	.8866+00	.8000+00	.740	
2301.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.176	.344	.500	.500	.6000+00	.6000+00	.006	
2305.	.000	.000	.000	.000	.000	.000	.000	.000	.001	.014	.070	.210	.444	.444	.6100+00	.6100+00	.134	
2311.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.004	.041	.144	.385	.385	.7700+00	.7700+00	.004	
2315.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.020	.064	.234	.234	.8026+01	.6200+00	.031	
2321.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.041	.183	.183	.6831+01	.9800+00	.161	
2325.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.024	.143	.143	.6869+01	.8300+00	.039	
2331.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.019	.117	.117	.6227+01	.6000+00	.001	
2335.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.014	.115	.115	.6918+01	.7100+00	.004	
2340.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.119	.119	.5109+01	.4600+00	.000	
2345.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.007	.018	.113	.113	.5815+01	.6600+00	.201	
2351.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.025	.134	.134	.6954+01	.6300+00	.019	
2355.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.101	.101	.7539+01	.5600+00	.000	
2360.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.006	.047	.7539+01	.5600+00	.000	
2365.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.004	.045	.8586+01	.6300+00	.000	
2371.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.6211+01	.6800+00	.000	
2375.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.6211+01	.6800+00	.000	
2381.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.3600+01	.6500+00	.006	
2385.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1684+01	.6100+00	.004	
2391.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1684+01	.6100+00	.004	
2395.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.2055+00	.7800+00	.001	
2401.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.3802+01	.9500+00	.001	
2405.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.5811+01	.9500+00	.001	
2411.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.2900+01	.9900+00	.000	
2415.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.2900+01	.9900+00	.000	
2421.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2425.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2431.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2435.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2441.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2445.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2451.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2455.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2461.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2465.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2471.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	
2475.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.123	.123	.1169+01	.9200+00	.057	

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[illegible]

UNCLASSIFIED

UNCLASSIFIED



CARBON DIOXIDE AT 1.00 ATMOSPHERE

T=300 K

FREQ.	1000	5000	2000	1000	500	200	100	50	20	10	5	2	1	0.5	0.2	A	R ERROR
2650	.714	.850	.939	.974	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.161E-04	.1080+01
2670	.736	.860	.944	.977	.996	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.161E-04	.1070+01
2690	.753	.869	.950	.980	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.136E-04	.1000+01
2710	.768	.878	.954	.985	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.116E-04	.1090+01
2730	.782	.886	.957	.985	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.987E-05	.1100+01
2750	.796	.893	.961	.987	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.916E-05	.1100+01
2770	.809	.900	.964	.989	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.777E-05	.1110+01
2790	.820	.907	.967	.991	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.181E-04	.1010+01
2810	.832	.913	.970	.992	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.615E-05	.1120+01
2830	.843	.919	.972	.993	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.521E-05	.1130+01
2850	.852	.924	.974	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.446E-05	.1140+01
2870	.861	.930	.978	.996	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.316E-05	.1170+01
2890	.869	.935	.980	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.246E-05	.1190+01
2910	.877	.939	.982	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.210E-05	.1200+01
2930	.885	.944	.985	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.188E-05	.1230+01
2950	.892	.948	.987	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.155E-05	.1250+01
2970	.899	.952	.989	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.137E-05	.1370+01
2990	.905	.955	.991	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.992E-06	.1370+01
3010	.911	.958	.992	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.638E-06	.1300+01
3030	.916	.961	.993	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.543E-06	.1310+01
3050	.921	.963	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.425E-06	.1330+01
3070	.926	.967	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.610E-09	.2000+01
3090	.931	.968	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.234E-06	.1350+01
3110	.935	.972	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.181E-06	.1400+01
3130	.940	.974	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.118E-06	.1400+01
3150	.944	.977	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.992E-07	.1450+01
3170	.948	.979	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.637E-07	.1490+01
3190	.952	.981	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.409E-07	.1530+01
3210	.952	.983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.237E-07	.1580+01
3230	.957	.985	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.671E-09	.2000+01
3250	.960	.987	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1710+01	.1710+01
3270	.963	.990	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.639E-08	.1710+01
3290	.968	.991	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.283E-08	.1790+01
3310	.970	.992	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.346E-09	.2000+01
3330	.973	.993	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.324E-09	.2000+01
3350	.974	.994	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.302E-09	.2000+01
3370	.975	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.281E-09	.2000+01
3390	.975	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.249E-09	.2000+01

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CARBON DIOXIDE AT 1.00 ATMOSPHERE
T=300 K

FRÉq.	10000	50000	20000	10000	5000	2000	1000	500	200	100	50	20	10	5	2	1	0.5	0.2	0.1	0.05	0.02	0.01	0.005	0.002	0.001	0.0005	0.0002	0.0001	0.00005	0.00002	0.00001	0.000005	0.000002	0.000001	0.0000005	0.0000002	0.0000001	0.00000005	0.00000002	0.00000001	0.000000005	0.000000002	0.000000001	0.0000000005	0.0000000002	0.0000000001	0.00000000005	0.00000000002	0.00000000001	0.000000000005	0.000000000002	0.000000000001	0.0000000000005	0.0000000000002	0.0000000000001	0.00000000000005	0.00000000000002	0.00000000000001	0.000000000000005	0.000000000000002	0.000000000000001	0.0000000000000005	0.0000000000000002	0.0000000000000001	0.00000000000000005	0.00000000000000002	0.00000000000000001	0.000000000000000005	0.000000000000000002	0.000000000000000001	0.0000000000000000005	0.0000000000000000002	0.0000000000000000001	0.00000000000000000005	0.00000000000000000002	0.00000000000000000001	0.000000000000000000005	0.000000000000000000002	0.000000000000000000001	0.0000000000000000000005	0.0000000000000000000002	0.0000000000000000000001	0.00000000000000000000005	0.00000000000000000000002	0.00000000000000000000001	0.000000000000000000000005	0.000000000000000000000002	0.000000000000000000000001	0.0000000000000000000000005	0.0000000000000000000000002	0.0000000000000000000000001	0.00000000000000000000000005	0.00000000000000000000000002	0.00000000000000000000000001	0.000000000000000000000000005	0.000000000000000000000000002	0.000000000000000000000000001	0.0000000000000000000000000005	0.0000000000000000000000000002	0.0000000000000000000000000001	0.00000000000000000000000000005	0.00000000000000000000000000002	0.00000000000000000000000000001	0.000000000000000000000000000005	0.000000000000000000000000000002	0.000000000000000000000000000001	0.0000000000000000000000000000005	0.0000000000000000000000000000002	0.0000000000000000000000000000001	0.00000000000000000000000000000005	0.00000000000000000000000000000002	0.00000000000000000000000000000001	0.000000000000000000000000000000005	0.000000000000000000000000000000002	0.000000000000000000000000000000001	0.0000000000000000000000000000000005	0.0000000000000000000000000000000002	0.0000000000000000000000000000000001	0.00000000000000000000000000000000005	0.00000000000000000000000000000000002	0.00000000000000000000000000000000001	0.000000000000000000000000000000000005	0.000000000000000000000000000000000002	0.000000000000000000000000000000000001	0.0000000000000000000000000000000000005	0.0000000000000000000000000000000000002	0.0000000000000000000000000000000000001	0.00000000000000000000000000000000000005	0.00000000000000000000000000000000000002	0.00000000000000000000000000000000000001	0.000000000000000000000000000000000000005	0.000000000000000000000000000000000000002	0.000000000000000000000000000000000000001	0.0000000000000000000000000000000000000005	0.0000000000000000000000000000000000000002	0.0000000000000000000000000000000000000001	0.005	0.002	0.001	0.0005	0.0002	0.0001	0.005	0.002	0.001	0.0005	0.000
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CARBON DIOXIDE AT 1.00 ATMOSPHERE									
T=300 K									
FREQ.	10000	5000	2000	1000	500.0	200.0	100.0	50.00	20.00
3400.	.722	.847	.929	.963	.981	.992	.996	.998	.999
3410.	.653	.789	.870	.907	.929	.945	.955	.966	.977
3415.	.637	.789	.870	.907	.929	.945	.955	.966	.977
3420.	.625	.789	.870	.907	.929	.945	.955	.966	.977
3425.	.614	.789	.870	.907	.929	.945	.955	.966	.977
3430.	.604	.789	.870	.907	.929	.945	.955	.966	.977
3435.	.594	.789	.870	.907	.929	.945	.955	.966	.977
3440.	.585	.789	.870	.907	.929	.945	.955	.966	.977
3445.	.576	.789	.870	.907	.929	.945	.955	.966	.977
3450.	.567	.789	.870	.907	.929	.945	.955	.966	.977
3455.	.558	.789	.870	.907	.929	.945	.955	.966	.977
3460.	.549	.789	.870	.907	.929	.945	.955	.966	.977
3465.	.540	.789	.870	.907	.929	.945	.955	.966	.977
3470.	.531	.789	.870	.907	.929	.945	.955	.966	.977
3475.	.522	.789	.870	.907	.929	.945	.955	.966	.977
3480.	.513	.789	.870	.907	.929	.945	.955	.966	.977
3485.	.504	.789	.870	.907	.929	.945	.955	.966	.977
3490.	.495	.789	.870	.907	.929	.945	.955	.966	.977
3495.	.486	.789	.870	.907	.929	.945	.955	.966	.977
3500.	.477	.789	.870	.907	.929	.945	.955	.966	.977
3505.	.468	.789	.870	.907	.929	.945	.955	.966	.977
3510.	.459	.789	.870	.907	.929	.945	.955	.966	.977
3515.	.450	.789	.870	.907	.929	.945	.955	.966	.977
3520.	.441	.789	.870	.907	.929	.945	.955	.966	.977
3525.	.432	.789	.870	.907	.929	.945	.955	.966	.977
3530.	.423	.789	.870	.907	.929	.945	.955	.966	.977
3535.	.414	.789	.870	.907	.929	.945	.955	.966	.977
3540.	.405	.789	.870	.907	.929	.945	.955	.966	.977
3545.	.396	.789	.870	.907	.929	.945	.955	.966	.977
3550.	.387	.789	.870	.907	.929	.945	.955	.966	.977
3555.	.378	.789	.870	.907	.929	.945	.955	.966	.977
3560.	.369	.789	.870	.907	.929	.945	.955	.966	.977
3565.	.360	.789	.870	.907	.929	.945	.955	.966	.977
3570.	.351	.789	.870	.907	.929	.945	.955	.966	.977
3575.	.342	.789	.870	.907	.929	.945	.955	.966	.977
3580.	.333	.789	.870	.907	.929	.945	.955	.966	.977
3585.	.324	.789	.870	.907	.929	.945	.955	.966	.977
3590.	.315	.789	.870	.907	.929	.945	.955	.966	.977
3595.	.306	.789	.870	.907	.929	.945	.955	.966	.977
3600.	.297	.789	.870	.907	.929	.945	.955	.966	.977

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CARBON DIOXIDE AT 1.00 ATMOSPHERE															
T=300 K															
FREQ.	10000	5000	2000	1000	500	200	100	50	20	10	5	2	1	0.5	0.2
3590.	.000	.000	.000	.000	.000	.000	.000	.001	.012	.092	.222	.388	.600	.729	.915
3595.	.000	.000	.000	.000	.000	.000	.000	.000	.006	.064	.177	.336	.555	.689	.895
3600.	.000	.000	.000	.000	.000	.000	.000	.000	.006	.064	.179	.340	.555	.689	.891
3603.	.000	.000	.000	.000	.000	.000	.000	.001	.013	.100	.237	.406	.610	.731	.910
3610.	.000	.000	.000	.000	.000	.000	.000	.002	.020	.082	.254	.423	.583	.749	.902
3613.	.000	.000	.000	.000	.000	.000	.000	.002	.022	.081	.268	.432	.584	.744	.898
3620.	.000	.000	.000	.000	.000	.000	.000	.001	.017	.068	.231	.331	.484	.611	.727
3623.	.000	.000	.000	.000	.000	.000	.000	.000	.008	.068	.182	.331	.534	.602	.783
3633.	.000	.000	.000	.000	.000	.000	.000	.001	.034	.095	.219	.372	.565	.687	.866
3637.	.000	.000	.000	.000	.000	.000	.000	.004	.038	.174	.331	.489	.666	.770	.852
3643.	.000	.000	.000	.000	.000	.000	.000	.010	.053	.197	.357	.511	.693	.801	.881
3649.	.000	.000	.000	.000	.000	.000	.000	.012	.060	.165	.369	.557	.886	.904	.988
3653.	.000	.000	.000	.000	.000	.000	.000	.035	.123	.276	.694	.827	.921	.959	.979
3655.	.000	.000	.000	.000	.000	.000	.000	.041	.183	.363	.624	.779	.949	.974	.987
3660.	.000	.000	.000	.000	.000	.000	.000	.087	.227	.413	.650	.798	.951	.975	.987
3665.	.000	.000	.000	.000	.000	.000	.000	.014	.222	.404	.638	.771	.963	.966	.983
3673.	.000	.000	.000	.000	.000	.000	.000	.034	.173	.351	.586	.725	.910	.950	.973
3675.	.000	.000	.000	.000	.000	.000	.000	.021	.093	.232	.458	.612	.734	.848	.907
3683.	.000	.000	.000	.000	.000	.000	.000	.018	.086	.278	.451	.606	.761	.845	.907
3690.	.000	.000	.000	.000	.000	.000	.000	.008	.054	.223	.400	.568	.738	.828	.892
3693.	.000	.000	.000	.000	.000	.000	.000	.001	.016	.108	.249	.417	.560	.689	.709
3695.	.000	.000	.000	.000	.000	.000	.000	.000	.006	.056	.185	.347	.560	.689	.709
3703.	.000	.000	.000	.000	.000	.000	.000	.000	.002	.035	.123	.269	.486	.630	.744
3713.	.000	.000	.000	.000	.000	.000	.000	.000	.004	.050	.151	.302	.520	.660	.769
3715.	.000	.000	.000	.000	.000	.000	.000	.000	.009	.081	.205	.367	.583	.717	.817
3723.	.000	.000	.000	.000	.000	.000	.000	.002	.019	.120	.262	.431	.641	.766	.858
3725.	.000	.000	.000	.000	.000	.000	.000	.000	.008	.071	.185	.341	.551	.683	.787
3733.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.019	.084	.200	.415	.563	.689
3735.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.014	.069	.183	.391	.547	.680
3743.	.000	.000	.000	.000	.000	.000	.000	.000	.001	.022	.088	.211	.425	.584	.718
3745.	.000	.000	.000	.000	.000	.000	.000	.001	.007	.056	.149	.289	.513	.672	.797
3750.	.000	.000	.000	.000	.000	.000	.000	.013	.056	.194	.353	.531	.739	.850	.919
3753.	.000	.000	.000	.000	.000	.000	.000	.048	.280	.511	.675	.805	.912	.954	.977
3760.	.000	.000	.000	.000	.000	.000	.000	.052	.324	.544	.686	.844	.916	.959	.996
3763.	.003	.052	.296	.541	.736	.884	.947	.975	.993	1.000	1.000	1.000	1.000	1.000	1.000
3773.	.014	.111	.408	.637	.798	.917	.963	.983	.998	1.000	1.000	1.000	1.000	1.000	1.000

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PRESSURE, 10000 5000, 2000, 1000, 500.0	CARBON DIOXIDE AT 1.00 ATMOSPHERE					λ	R ERROR												
	200.0	100.0	50.0	20.0	10.0														
3775.	038	182	492	696	837	933	969	986	998	999	1.000	1.000	1.000	1.000	1.000	1.000	5186-03	9500+00	001
3780.	071	250	583	733	851	942	973	989	997	999	999	1.000	1.000	1.000	1.000	1.000	5036-02	9300+00	000
3785.	103	299	585	747	856	942	972	990	996	998	999	1.000	1.000	1.000	1.000	1.000	5701-03	9000+00	000
3790.	115	306	575	729	878	929	964	985	994	995	998	999	1.000	1.000	1.000	1.000	7848-03	8600+00	002
3795.	122	303	557	706	818	915	957	979	991	996	998	999	1.000	1.000	1.000	1.000	1325-02	8000+00	001
3800.	137	319	565	707	818	911	956	977	990	995	998	999	1.000	1.000	1.000	1.000	1596-02	7800+00	001
3805.	141	321	541	436	768	858	935	967	983	993	996	998	999	1.000	1.000	1.000	4556-02	6300+00	103
3810.	151	321	559	731	830	915	958	977	996	997	998	999	999	1.000	1.000	1.000	2350-02	7100+00	003
3815.	170	333	558	698	808	907	949	973	989	994	997	999	999	1.000	1.000	1.000	2815-02	7000+00	001
3820.	185	345	578	708	816	892	956	973	986	994	997	999	1.000	1.000	1.000	7658-03	7300+00	017	
3825.	164	312	586	941	973	989	994	999	999	1.000	1.000	1.000	1.000	1.000	1.000	6105-03	7800+00	002	
3830.	166	302	918	959	982	992	998	999	999	1.000	1.000	1.000	1.000	1.000	1.000	6489-03	9500+00	005	
3835.	726	835	931	967	983	993	997	998	999	1.000	1.000	1.000	1.000	1.000	1.000	6782-04	8200+00	000	
3840.	589	946	982	993	997	998	999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	7658-03	9500+00	005	
3845.	953	982	999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	3636-08	2000+01	001	
3850.	965	988	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2353-07	1580+01	000	
3855.	972	992	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	4724-08	1720+01	000	
3860.	980	998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	5428-09	1930+01	000	
3865.	980	998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2016-09	2000+01	000	
3870.	980	998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1945-09	2000+01	000	
3875.	980	998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	9484-10	2000+01	000	
3880.	980	998	1.000	1.000	1.000</														

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WESTINGHOUSE DEFENSE AND ELECTRONIC SYSTEMS CENTER B--ETC F/G 20/6
HIDE REVISED WAVELENGTH RESOLUTION EMISSION AND TRANSMISSION MO--ETC(U)
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CARBON DIOXIDE AT 1.00 ATMOSPHERE
T=300 K

FREQ.	10000	5000	2000	1000	500.0	200.0	100.0	50.0	20.0	10.0	5.000	2.000	1.000	0.500	0.200	A	R	ERROR
4863.	.075	.081	.190	.346	.491	.664	.767	.847	.922	.957	.977	.990	.995	.997	.999	.5043-01	.8400+00	.368
4873.	.002	.021	.115	.257	.418	.669	.726	.819	.907	.949	.973	.989	.994	.997	.999	.1418-01	.6600+00	.010
4883.	.028	.086	.238	.492	.647	.716	.812	.882	.947	.969	.984	.998	.999	.999	.999	.1098-01	.6300+00	.063
4893.	.097	.215	.423	.692	.730	.856	.915	.952	.975	.989	.994	.998	.999	1.000	1.000	.4508-02	.6000+00	.026
4903.	.192	.357	.689	.739	.848	.952	.965	.982	.993	.996	.999	.999	1.000	1.000	1.000	.1055-02	.8000+00	.015
4913.	.207	.367	.634	.780	.877	.947	.973	.986	.994	.997	.999	.999	1.000	1.000	1.000	.1332-02	.7700+00	.007
4923.	.123	.292	.548	.716	.836	.927	.963	.981	.992	.996	.998	.998	1.000	1.000	1.000	.1455-02	.7900+00	.002
4933.	.084	.176	.298	.573	.719	.854	.916	.954	.981	.990	.995	.998	.999	1.000	1.000	.1015-01	.6000+00	.101
4943.	.018	.065	.212	.362	.521	.706	.816	.885	.945	.970	.985	.994	.997	.998	.999	.1477-01	.6100+00	.015
4953.	.002	.012	.076	.183	.331	.544	.683	.791	.889	.936	.966	.986	.993	.996	.998	.8316-01	.5700+00	.071
4963.	.000	.001	.026	.101	.236	.454	.606	.727	.845	.907	.948	.978	.989	.994	.998	.2102-01	.6800+00	.004
4973.	.000	.002	.056	.108	.244	.464	.617	.735	.855	.914	.952	.980	.996	.998	.998	.2022-01	.6700+00	.229
4983.	.000	.002	.027	.095	.220	.434	.591	.720	.844	.908	.949	.978	.989	.994	.998	.3186-01	.6200+00	.016
4993.	.000	.003	.019	.076	.191	.397	.551	.683	.816	.888	.937	.973	.986	.993	.997	.5542-01	.5500+00	.215
5003.	.007	.020	.090	.184	.216	.516	.643	.752	.826	.916	.953	.986	.990	.995	.996	.6741-01	.4700+00	.257
5013.	.145	.245	.392	.514	.632	.764	.848	.897	.948	.971	.985	.994	.997	.998	.999	.2147-01	.4900+00	.013
5023.	.424	.582	.747	.830	.898	.949	.971	.984	.993	.997	.999	.999	1.000	1.000	1.000	.1641-02	.6800+00	.000
5033.	.616	.772	.895	.949	.975	.990	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.9260-04	.9300+00	.000
5043.	.574	.737	.876	.929	.962	.984	.992	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	.1679-03	.8800+00	.000
5053.	.468	.577	.757	.849	.910	.958	.978	.988	.994	.998	.999	1.000	1.000	1.000	1.000	.1804-02	.8600+00	.005
5063.	.251	.405	.619	.742	.832	.911	.949	.972	.988	.994	.997	.999	.999	1.000	1.000	.2326-02	.7000+00	.000
5073.	.111	.250	.455	.603	.719	.832	.893	.936	.971	.985	.992	.997	.998	.999	1.000	.6031-02	.6400+00	.001
5083.	.023	.112	.299	.480	.604	.751	.833	.896	.951	.974	.986	.994	.997	.998	.999	.5695-02	.7000+00	.019
5093.	.028	.161	.283	.440	.595	.748	.833	.894	.951	.974	.987	.994	.997	.998	.999	.7169-02	.6700+00	.153
5103.	.027	.092	.258	.412	.565	.730	.822	.891	.949	.973	.986	.994	.997	.998	.999	.1203-01	.6200+00	.008
5113.	.023	.057	.176	.320	.477	.661	.772	.857	.921	.963	.981	.992	.996	.998	.999	.2705-01	.5800+00	.083
5123.	.021	.065	.206	.355	.513	.691	.797	.874	.945	.962	.984	.993	.996	.998	.999	.1861-01	.5800+00	.028
5133.	.097	.204	.398	.558	.706	.836	.903	.945	.976	.988	.994	.997	.999	.999	1.000	.7857-02	.6200+00	.011
5143.	.242	.358	.608	.748	.820	.932	.968	.982	.993	.996	.999	.999	1.000	1.000	1.000	.3357-02	.6600+00	.017
5153.	.586	.685	.865	.883	.963	.972	.985	.992	.997	.999	.999	1.000	1.000	1.000	1.000	.7275-03	.7200+00	.004
5163.	.819	.894	.952	.975	.987	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6070-04	.8800+00	.000
5173.	.964	.982	.993	.996	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3659-05	.1000+01	.000
5183.	.996	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1069-04	.6500+00	.000
5193.	.982	.993	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1802-06	.1250+01	.000
5203.	.975	.989	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5784-06	.1160+01	.000
5213.	.881	.990	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1216-08	.2000+01	.000
5223.	.977	.988	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1625-05	.1040+01	.000

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CARBON DIOXIDE AT 1.00 ATMOSPHERE

FREQ.	10000	5000	2000	1000	500.0	200.0	100.0	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	A	R ERROR
5233.	.976	.984	.992	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2278-04	.7600+00
5247.	.975	.985	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2849-05	.9900+00
5257.	.975	.985	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4563-07	.1260+01
5263.	.994	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5890-10	.2000+01
5273.	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8153-08	.1350+01
5283.	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6136-07	.1170+01
5293.	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8739-06	.8400+00
5303.	.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4710-10	.2000+01
5313.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5323.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5333.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5343.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5353.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5363.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5373.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5383.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5393.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5403.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5413.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5423.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5433.	1.030	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5443.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5453.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5463.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5473.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5483.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5493.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5503.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5513.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5523.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5533.	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5543.	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000-01
5553.	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.9401-11	.2000+01
5563.	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2163-06	.9300+00
5573.	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8153-08	.1350+01
5583.	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6136-07	.1170+01
5593.	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2329-06	.1660+01
5593.	.994	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5013-06	.1020+01

UNCLASSIFIED

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CARBON DIOXIDE AT 1.00 ATMOSPHERE

T=300 K

FREQ.	10000	5000	2000.	1000.	500.0	200.0	100.0	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	A	R	ERROR
5970.	.997	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1039-05	.8700+00	.000
5980.	.996	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1060+01	.8700+00	.000
5990.	.994	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1533-06	.1150+01	.000
6000.	.994	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1371-06	.1260+01	.000
6010.	.987	.994	.996	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2455-05	.9300+00	.000
6020.	.989	.995	.996	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3585-05	.8700+00	.000
6030.	.984	.992	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1611-05	.1000+01	.000
6040.	.962	.986	.992	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.7935-06	.1170+01	.000
6050.	.924	.959	.962	.991	.996	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6429-04	.7300+00	.000
6060.	.893	.929	.973	.986	.993	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5087-04	.8400+00	.000
6070.	.908	.946	.977	.988	.994	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2946-04	.8800+00	.000
6080.	.902	.948	.976	.988	.994	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1963-04	.9300+00	.000
6090.	.876	.939	.965	.984	.992	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2728-04	.8200+00	.000
6100.	.893	.951	.974	.987	.993	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2596-04	.9100+00	.000
6110.	.935	.964	.967	.993	.997	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8072-04	.7300+00	.000
6120.	.967	.983	.993	.997	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4039-05	.9800+00	.000
6130.	.969	.984	.994	.997	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3458-05	.9900+00	.000
6140.	.966	.982	.991	.997	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.7234-05	.8200+00	.000
6150.	.976	.985	.994	.997	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.9877-05	.8500+00	.000
6160.	.961	.986	.992	.996	.998	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6181-06	.1200+01	.000
6170.	.915	.937	.982	.991	.998	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3407-04	.8600+00	.000
6180.	.852	.918	.965	.982	.991	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3060-04	.9300+00	.000
6190.	.777	.865	.936	.966	.982	.993	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.1107-03	.8400+00	.000
6200.	.652	.767	.874	.926	.950	.963	.972	.985	.992	.997	.998	.999	1.000	1.000	1.000	.5178-03	.7300+00	.000
6210.	.635	.677	.812	.886	.935	.972	.985	.992	.997	.998	.999	.999	1.000	1.000	1.000	.2350-02	.5800+00	.007
6220.	.575	.704	.836	.897	.941	.974	.987	.993	.997	.999	.999	.999	1.000	1.000	1.000	.7388-03	.7200+00	.000
6230.	.565	.708	.830	.896	.941	.974	.987	.993	.997	.999	.999	.999	1.000	1.000	1.000	.6890-03	.7300+00	.000
6240.	.548	.675	.805	.879	.930	.965	.984	.992	.997	.999	.999	.999	1.000	1.000	1.000	.1271-02	.6700+00	.001
6250.	.594	.714	.834	.899	.942	.975	.987	.993	.997	.999	.999	.999	1.000	1.000	1.000	.9162-03	.6900+00	.001
6260.	.771	.852	.924	.957	.977	.990	.995	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	.2395-03	.7600+00	.000
6270.	.924	.958	.982	.991	.995	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1816-04	.9100+00	.000
6280.	.978	.985	.995	.998	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.7671-05	.8700+00	.000
6290.	.975	.987	.995	.997	.999	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2789-05	.9900+00	.000
6300.	.924	.956	.980	.990	.995	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2640-04	.8700+00	.000
6310.	.822	.886	.942	.967	.983	.993	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.1807-03	.7600+00	.000
6320.	.681	.781	.876	.926	.958	.982	.991	.995	.998	.999	.999	.999	1.000	1.000	1.000	.6169-03	.7000+00	.000
6330.	.552	.682	.811	.882	.932	.970	.984	.992	.997	.999	.999	.999	1.000	1.000	1.000	.1143-02	.6800+00	.001

UNCLASSIFIED

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CARBON DIOXIDE AT 1.00 ATMOSPHERE T=300 K															
FREQ.	10000	5000.	2000.	1000.	500.0	200.0	100.0	50.0	20.0	10.0	5.00	2.00	1.000	0.500	0.200
6340.	.552	.667	.819	.888	.936	.972	.985	.993	.997	.998	.999	1.000	1.000	1.000	.1056-02
6350.	.546	.681	.814	.885	.934	.971	.985	.992	.997	.998	.999	1.000	1.000	1.000	.9679+00
6360.	.463	.609	.764	.851	.913	.961	.980	.986	.998	.998	.999	1.000	1.000	1.000	.1355-02
6370.	.401	.647	.795	.874	.928	.968	.984	.992	.996	.998	.999	1.000	1.000	1.000	.9000+00
6380.	.746	.835	.915	.952	.974	.989	.994	.997	.999	1.000	1.000	1.000	1.000	1.000	.2255-03
6390.	.951	.973	.989	.994	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2699+00
6400.	.987	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1055-04
6410.	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1277+09
6420.	.998	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2000+01
6430.	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8153+08
6440.	.994	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6153+01
6450.	.988	.994	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1039-05
6460.	.973	.986	.994	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5013+06
6470.	.936	.964	.985	.992	.998	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8314+06
6480.	.891	.936	.971	.985	.992	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.4746+05
6490.	.876	.926	.966	.982	.997	.998	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.1394+04
6500.	.878	.928	.965	.983	.991	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.4225+04
6510.	.846	.864	.956	.977	.988	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.8700+00
6520.	.626	.697	.953	.975	.987	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.2191+03
6530.	.6523	.914	.952	.972	.984	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	.9533+04
6540.	.6533	.915	.987	.995	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2268+04
6550.	.6543	.915	.987	.994	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3341+05
6560.	.6553	.915	.989	.996	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1950+01
6570.	.6563	.917	.994	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8330+06
6580.	.6573	.917	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8706+07
6590.	.6583	.919	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.9401+11
6600.	.6593	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2000+01
6610.	.6603	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6620.	.6613	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6630.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6640.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6650.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6660.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6670.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1000+01
6680.	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.9401+11
6690.	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.8153+08
6700.	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1039+00

B-26

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CARBON DIOXIDE AT 1.00 ATMOSPHERE

FREQ.	10000	5000	2000	1000	500.0	200.0	100.0	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	A	R ERROR
6710.	.994	.997	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5013-06	.1020+01
6720.	.989	.994	.998	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1470-05	.9700+00
6730.	.961	.968	.974	.974	.978	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3795-09	.2000+01
6740.	.972	.983	.994	.994	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6647-05	.9100+00
6750.	.945	.970	.988	.988	.994	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.9026-05	.9500+00
6760.	.922	.957	.982	.982	.991	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1702-04	.9200+00
6770.	.921	.962	.984	.984	.992	.996	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5671-05	.1040+01
6780.	.893	.936	.966	.966	.990	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.7296-04	.4100+00
6790.	.867	.937	.973	.973	.986	.993	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4160-05	.1060+01
6800.	.923	.967	.981	.981	.990	.995	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.7835-05	.1000+01
6810.	.990	.993	.998	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2903-05	.8900+00
6820.	.993	.997	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1600-06	.1160+01
6830.	.998	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3649-05	.7000+00
6840.	.995	.998	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4563-07	.1260+01
6850.	.985	.995	.996	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.2137-06	.1210+01
6860.	.970	.988	.995	.995	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.9044-06	.1130+01
6870.	.945	.974	.985	.985	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.7383-05	.9700+00
6880.	.902	.948	.975	.975	.989	.995	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1964-04	.9300+00
6890.	.824	.903	.958	.958	.973	.989	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3370-04	.9400+00
6900.	.707	.822	.917	.917	.956	.978	.991	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	.1156-03	.8700+00
6910.	.585	.721	.862	.862	.920	.960	.981	.992	.996	.998	.999	1.000	1.000	1.000	1.000	.3426-03	.8000+00
6920.	.450	.646	.806	.806	.887	.938	.972	.986	.993	.997	.999	.999	1.000	1.000	1.000	.3478-03	.8400+00
6930.	.405	.572	.751	.751	.844	.868	.954	.976	.985	.996	.998	.999	1.000	1.000	1.000	.1432-02	.7000+00
6940.	.371	.538	.641	.641	.762	.850	.925	.959	.978	.991	.995	.998	.999	1.000	1.000	.5554-02	.5700+00
6950.	.345	.447	.555	.555	.655	.797	.892	.938	.967	.984	.993	.996	.998	.999	1.000	.1489-01	.4600+00
6960.	.246	.386	.535	.535	.737	.868	.893	.935	.967	.988	.993	.996	.996	.996	.996	.3277-02	.6600+00
6970.	.259	.412	.536	.536	.712	.862	.892	.937	.968	.985	.992	.996	.999	.999	1.000	.4106-02	.6300+00
6980.	.283	.395	.485	.485	.694	.769	.834	.902	.948	.977	.982	.994	.996	.999	1.000	.1301-01	.5000+00
6990.	.436	.498	.605	.605	.695	.776	.876	.923	.957	.982	.991	.995	.998	.999	1.000	.1548-01	.5400+00
7000.	.535	.568	.613	.613	.935	.956	.978	.987	.993	.997	.999	.999	1.000	1.000	1.000	.4864-03	.7800+00
7010.	.475	.588	.690	.690	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1287-08	.2000+01
7020.	.982	.997	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.6557-06	.1110+01
7030.	.991	.995	.998	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1325-05	.9600+00
7040.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000+01
7050.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000+01
7060.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000+01
7070.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.0000	.1000+01

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B-29

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B-30

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B-32

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T_{EX} 00 K

FILE#	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	U (PR.CM.) A	M	ERROR
1000.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1291-01	1070+01	.001
1005.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1106-01	1100+01	.001
1010.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	863-01	9500+00	.001
1015.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	3113-01	9500+00	.001
1020.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1696-01	1040+01	.001
1025.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1924-01	9900+00	.001
1030.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1035.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1040.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1045.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1050.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1055.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1060.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1065.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1070.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1075.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1080.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1085.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1090.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1095.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1100.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1105.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1110.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1115.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1120.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1125.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1130.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1135.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1140.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1145.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1150.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1155.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1160.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1165.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1170.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1175.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001
1180.	743	715	659	543	489	447	409	377	349	325	303	283	265	249	235	1866-01	1030+01	.001

B-33

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

PR.	70.00	80.00	90.00	10.00	5.00	2.00	1.00	0.50	0.20	0.10	0.05	0.02	0.01	0.005	0.002	0.001	II (PR.CM.) A	P	ERROR
1185.	.025	.157	.329	.514	.714	.820	.895	.938	.964	.980	.992	.996	.998	.999	.999	1.000	.1963+00	.7500+00	.000
1190.	.032	.193	.392	.583	.787	.872	.924	.962	.978	.988	.995	.997	.999	.999	.999	1.000	.1445+00	.8100+00	.001
1195.	.042	.241	.457	.652	.837	.912	.954	.978	.988	.994	.998	.999	.999	.999	.999	1.000	.1053+00	.8700+00	.001
1200.	.057	.283	.515	.705	.887	.947	.978	.992	.998	.999	.999	.999	.999	.999	.999	1.000	.1517+00	.8100+00	.001
1205.	.074	.325	.575	.765	.945	.995	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1002+00	.9000+00	.001
1210.	.094	.375	.645	.835	.995	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2798+00	.7200+00	.013
1215.	.117	.425	.715	.905	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2823+00	.7400+00	.002
1220.	.144	.475	.785	.975	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2824+00	.7600+00	.002
1225.	.174	.525	.845	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3904+00	.6900+00	.003
1230.	.207	.575	.905	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1731+00	.8100+00	.007
1235.	.244	.625	.955	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1823+00	.8200+00	.001
1240.	.284	.675	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3292+00	.7500+00	.005
1245.	.327	.725	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3460+00	.7200+00	.005
1250.	.374	.775	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2538+00	.8000+00	.002
1255.	.425	.825	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3371+00	.8000+00	.002
1260.	.475	.875	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.5732+00	.7200+00	.001
1265.	.525	.925	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.8954+00	.6800+00	.016
1270.	.575	.975	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1331+01	.6200+00	.008
1275.	.625	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3713+00	.7900+00	.002
1280.	.675	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.5269+00	.7100+00	.004
1285.	.725	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.9880+00	.6900+00	.001
1290.	.775	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.8329+00	.6700+00	.003
1295.	.825	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.7653+00	.7000+00	.006
1300.	.875	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3906+00	.8100+00	.000
1305.	.925	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.4504+00	.8100+00	.003
1310.	.975	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1421+01	.6400+00	.002
1315.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.3099+01	.6400+00	.004
1320.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2243+01	.6300+00	.009
1325.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1391+01	.7000+00	.033
1330.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1327+01	.7900+00	.006
1335.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2171+01	.6500+00	.020
1340.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.4575+01	.5900+00	.015
1345.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1726+01	.7200+00	.009
1350.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.1707+01	.7600+00	.002
1355.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.2373+01	.6700+00	.040
1360.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.4371+01	.6500+00	.025
1365.	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	.999	1.000	.4406+01	.6200+00	.092

UNCLASSIFIED

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

Frq.	50.00	20.00	10.00	5.00	2.00	1.00	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	A	U(Pr.CM.)	R	Error
1370.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3849+01	6900+00	0.002	
1375.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5796+01	6300+00	0.001	
1380.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3866+01	6700+00	0.038	
1385.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3585+01	6900+00	0.011	
1390.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3782+01	6800+00	0.016	
1395.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1073+02	6300+00	0.011	
1400.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1817+01	6500+00	0.005	
1405.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5525+01	7000+00	0.000	
1410.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5316+01	7800+00	0.003	
1415.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6873+01	6000+00	0.028	
1420.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1036+02	6000+00	0.035	
1425.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8557+01	7000+00	0.007	
1430.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7989+01	7300+00	0.001	
1435.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7477+01	5200+00	0.043	
1440.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5732+01	7400+00	0.089	
1445.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5806+01	7900+00	0.002	
1450.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1144+02	7300+00	0.002	
1455.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9703+01	4900+00	0.038	
1460.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1325+02	6000+00	0.048	
1470.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9619+01	7300+00	0.004	
1475.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4832+01	6200+00	0.043	
1480.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1326+02	5700+00	0.000	
1485.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1080+02	7500+00	0.010	
1490.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9800+01	6600+00	0.009	
1495.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	831	895	0.003	
1500.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	837	1678+02	0.002	
1505.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	798	1710+02	0.002	
1510.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	843	1700+02	0.002	
1515.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	758	1566+02	0.137	
1520.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	705	12416+02	0.003	
1525.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	605	731	0.001	
1530.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	815	2215+02	0.003	
1535.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	515	657	0.001	
1540.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364	2584+02	0.009	
1545.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	563	694	0.004	
1550.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	542	725	0.006	
1555.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	637	854	0.001	
1560.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2827+02	5600+00	0.002	
1565.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	563	709	0.001	
1570.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1573+02	5600+00	0.002	
1575.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	868	914	0.001	
1580.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	764	1403+02	0.001	

UNCLASSIFIED

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VAPOR VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K[illegible]

UNCLASSIFIED

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

FOR X	3000	2000	1000	500	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	1/(PR, CM.)	P	ERROR
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5990-01	.8600+00	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5725-01	.8600+00	.007
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4642-01	.9200+00	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2243-01	.1050+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3120-01	.9700+00	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3106-01	.9700+00	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2460-01	.1040+01	.003
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3638-01	.9300+00	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4204-01	.9100+00	.000
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3534-01	.9500+00	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1414-01	.1150+01	.007
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2659-01	.9300+00	.004
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2256-01	.1020+01	.004
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1923-01	.1120+01	.000
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7206-01	.8000+00	.010
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3373-01	.9400+00	.002
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8623-02	.1210+01	.002
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1476-01	.1100+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3555-01	.1080+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3192-01	.9600+00	.002
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1457-01	.1120+01	.003
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9965-02	.1160+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1496-01	.1060+01	.004
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2145-01	.9900+00	.007
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2156-01	.1000+01	.002
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8016-02	.1210+01	.003
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1004-01	.1150+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6548-01	.8100+00	.005
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5002-01	.8300+00	.009
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1400-01	.1080+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8635-02	.1180+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1854-01	.1080+01	.000
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3651-01	.9000+00	.000
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8924-02	.1170+01	.001
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1115-01	.1110+01	.002
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6840-02	.1200+01	.000
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1033-01	.1150+01	.002

B-40

UNCLASSIFIED

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE										T=300 K		U (PR. CM.)		A		R		P (PR. CM.)	
FREQ.	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001				
2480.	.396	.697	.936	.912	.967	.985	.991	.997	.998	.999	1.000	1.000	1.000	1.000	1.000	.1020+01	.000		
2485.	.436	.741	.987	.962	.992	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1180+01	.001		
2490.	.444	.749	.990	.961	.991	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1180+01	.001		
2495.	.441	.748	.989	.967	.992	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1110+01	.003		
2500.	.438	.746	.986	.961	.989	.996	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1110+01	.001		
2505.	.426	.731	.971	.955	.983	.996	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1140+01	.001		
2510.	.450	.754	.983	.965	.987	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1200+01	.001		
2515.	.435	.750	.981	.964	.982	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1040+01	.001		
2520.	.426	.748	.982	.959	.991	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1326+01	.001		
2525.	.431	.741	.982	.960	.991	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1326+01	.001		
2530.	.440	.741	.983	.963	.997	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1326+01	.001		
2535.	.424	.735	.975	.951	.990	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1326+01	.001		
2540.	.468	.717	.967	.951	.987	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1326+01	.002		
2545.	.411	.715	.970	.961	.991	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1353+01	.003		
2550.	.364	.678	.923	.916	.964	.985	.993	.997	.999	.999	1.000	1.000	1.000	1.000	1.000	.1353+01	.002		
2555.	.372	.674	.957	.940	.993	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1210+01	.004		
2560.	.385	.702	.957	.944	.984	.993	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1040+01	.006		
2565.	.348	.734	.941	.904	.932	.991	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1090+01	.002		
2570.	.366	.709	.953	.941	.982	.992	.994	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1130+01	.000		
2575.	.357	.680	.964	.913	.966	.984	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1147+01	.000		
2580.	.387	.644	.952	.940	.982	.992	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1130+01	.000		
2585.	.411	.744	.944	.941	.990	.996	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1318+01	.003		
2590.	.336	.649	.912	.914	.970	.984	.993	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	.1010+01	.006		
2595.	.267	.510	.759	.874	.954	.977	.984	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	.1226+01	.000		
2600.	.407	.725	.973	.953	.987	.994	.998	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1942+01	.000		
2605.	.412	.732	.977	.954	.984	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1969+01	.011		
2610.	.232	.515	.703	.840	.933	.966	.983	.994	.997	.998	.999	1.000	1.000	1.000	1.000	.1160+01	.000		
2615.	.306	.608	.740	.891	.958	.979	.990	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	.1160+01	.000		
2620.	.366	.710	.863	.947	.984	.993	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1160+01	.000		
2625.	.240	.587	.757	.873	.947	.973	.987	.995	.997	.999	1.000	1.000	1.000	1.000	1.000	.1160+01	.000		
2630.	.264	.674	.863	.916	.965	.987	.991	.996	.998	.999	1.000	1.000	1.000	1.000	1.000	.1061+01	.000		
2635.	.372	.698	.854	.941	.982	.992	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1150+01	.000		
2640.	.494	.705	.809	.947	.984	.993	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1140+01	.000		
2645.	.170	.431	.618	.770	.893	.943	.973	.988	.994	.997	.999	1.000	1.000	1.000	1.000	.1140+01	.000		
2650.	.214	.485	.771	.898	.955	.977	.991	.995	.998	.999	1.000	1.000	1.000	1.000	1.000	.1140+01	.005		
2655.	.354	.718	.846	.944	.984	.993	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.1140+01	.001		
2660.	.214	.485	.767	.898	.916	.955	.977	.991	.995	.998	.999	1.000	1.000	1.000	1.000	.1140+01	.000		
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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
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DATE	T=400 K										UPLR,CM.)		B	ERROR	
	0.000	0.000	0.000	0.002	0.031	1.000	0.500	0.200	0.100	0.050	0.020	0.010			0.005
3.355	0.000	0.000	0.000	0.002	0.031	0.094	0.167	0.278	0.520	0.654	0.802	0.853	0.936	0.972	0.986
3.400	0.000	0.000	0.000	0.207	0.431	0.794	1.047	0.796	0.857	0.903	0.949	0.971	0.984	0.994	0.997
3.445	0.000	0.019	0.103	0.266	0.514	0.600	0.780	0.877	0.923	0.913	0.977	0.968	0.994	0.997	0.990
3.490	0.007	0.157	0.399	0.483	0.484	0.600	0.806	0.812	0.919	0.960	0.978	0.988	0.995	0.998	0.999
3.535	0.010	0.175	0.399	0.483	0.484	0.600	0.806	0.812	0.919	0.960	0.978	0.988	0.995	0.998	0.999
3.580	0.001	0.111	0.063	0.249	0.341	0.544	0.706	0.796	0.861	0.920	0.951	0.972	0.988	0.994	0.999
3.625	0.001	0.000	0.047	0.152	0.264	0.384	0.553	0.663	0.755	0.849	0.903	0.943	0.974	0.988	0.994
3.670	0.000	0.002	0.027	0.102	0.209	0.316	0.472	0.712	0.794	0.856	0.915	0.946	0.969	0.986	0.993
3.715	0.000	0.005	0.021	0.191	0.401	0.615	0.776	0.879	0.925	0.955	0.977	0.987	0.993	0.997	0.999
3.760	0.000	0.004	0.036	0.128	0.307	0.444	0.605	0.697	0.776	0.846	0.916	0.952	0.974	0.989	0.994
3.805	0.000	0.001	0.027	0.093	0.269	0.411	0.540	0.681	0.766	0.837	0.910	0.948	0.972	0.988	0.994
3.850	0.000	0.002	0.029	0.158	0.332	0.509	0.628	0.824	0.894	0.939	0.973	0.986	0.993	0.997	0.999
3.895	0.000	0.006	0.064	0.064	0.332	0.608	0.195	0.65	0.517	0.661	0.810	0.886	0.936	0.972	0.986
3.940	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.247	0.447	0.596	0.761	0.854	0.918	0.964	0.982
3.985	0.000	0.000	0.001	0.023	0.026	0.026	0.159	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.030	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.075	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.120	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.165	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.210	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.255	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.300	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.345	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.390	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.435	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.480	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.525	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.570	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.615	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.660	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.705	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.750	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.795	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.840	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.885	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.930	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
4.975	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.020	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.065	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.110	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.155	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.200	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.245	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.290	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.335	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.380	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.425	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.470	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.515	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.560	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.605	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.650	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.695	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.740	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.785	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.830	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.875	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.920	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
5.965	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.010	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.055	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.100	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.145	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.190	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.235	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.280	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.325	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.370	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.415	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.460	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.505	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.550	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.595	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.640	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.277	0.525	0.658	0.800	0.880	0.933	0.971	0.985
6.685	0.000	0.000													

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

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 WATER VAPOR 1.00 ATMOSPHERE PRESSURE
 T=300 K

HEIGHT	50.00	20.00	10.00	5.000	2.500	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	II (PR. CM.)	B	ERROR	
32900.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1272+02	.5900+00	.007	
32950.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1688+02	.6700+00	.206	
33000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1101+02	.5000+00	.001	
33050.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7463+01	.4600+00	.004	
33100.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.5666+01	.4000+00	.015	
33150.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.5332+01	.3800+00	.017	
33200.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.5666+01	.4000+00	.015	
33250.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7990+01	.5000+00	.004	
33300.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.6862+01	.5300+00	.032	
33350.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.7914+01	.5300+00	.114	
33400.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1115+02	.5700+00	.250	
33450.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1234+02	.6100+00	.070	
33500.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1188+02	.6100+00	.028	
33550.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1283+02	.5900+00	.016	
33600.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1663+02	.6200+00	.033	
33650.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1521+02	.6100+00	.002	
33700.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1548+02	.6400+00	.007	
33750.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2075+02	.7800+00	.154	
33800.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1599+02	.6300+00	.016	
33850.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1519+02	.5900+00	.006	
33900.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1576+02	.5800+00	.003	
33950.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1527+02	.5700+00	.002	
34000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1869+02	.5800+00	.001	
34050.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1707+02	.5900+00	.001	
34100.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1746+02	.5700+00	.002	
34150.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2189+02	.6000+00	.007	
34200.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2911+02	.6300+00	.004	
34250.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2857+02	.5800+00	.006	
34300.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.4153+02	.5700+00	.001	
34350.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3153+02	.5000+00	.001	
34400.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2966+02	.4800+00	.006	
34450.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.3114+02	.4700+00	.015	
34500.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.2770+02	.4400+00	.182	
34550.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1889+02	.4400+00	.118	
34600.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.601	.1690+02	.5700+00	.001
34650.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1590+02	.6300+00	.023	
34700.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.1577+02	.7000+00	.002	

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

FILE	NAME	20.00	10.00	5.00	2.00	1.00	0.50	0.20	0.10	0.05	0.02	0.01	0.00	A	B	ERROR
31700	0000	0000	0000	0000	0000	0000	0000	0011	0065	0189	0420	0586	0725	0853	0914	0001
32000	0000	0000	0000	0000	0000	0000	0000	0016	0066	0228	0467	0620	0742	0852	0905	0003
32300	0000	0000	0000	0000	0000	0000	0000	0021	0101	0249	0471	0632	0748	0852	0905	0004
32600	0000	0000	0000	0000	0000	0000	0000	0026	0112	0261	0465	0632	0745	0847	0899	0006
32900	0000	0000	0000	0000	0000	0000	0000	0030	0121	0269	0467	0630	0742	0844	0896	0007
33200	0000	0000	0000	0000	0000	0000	0000	0034	0127	0276	0465	0637	0747	0847	0897	0008
33500	0000	0000	0000	0000	0000	0000	0000	0041	0136	0284	0467	0651	0769	0872	0923	0010
33800	0000	0000	0000	0000	0000	0000	0000	0048	0145	0293	0467	0658	0776	0879	0930	0012
34100	0000	0000	0000	0000	0000	0000	0000	0055	0154	0302	0467	0665	0783	0886	0937	0014
34400	0000	0000	0000	0000	0000	0000	0000	0062	0163	0311	0467	0672	0790	0893	0944	0016
34700	0000	0000	0000	0000	0000	0000	0000	0069	0172	0320	0467	0679	0797	0900	0951	0018
35000	0000	0000	0000	0000	0000	0000	0000	0076	0181	0329	0467	0686	0804	0907	0958	0020
35300	0000	0000	0000	0000	0000	0000	0000	0083	0190	0338	0467	0693	0811	0914	0965	0022
35600	0000	0000	0000	0000	0000	0000	0000	0090	0199	0347	0467	0700	0818	0921	0972	0024
35900	0000	0000	0000	0000	0000	0000	0000	0097	0208	0356	0467	0707	0825	0928	0979	0026
36200	0000	0000	0000	0000	0000	0000	0000	0104	0217	0365	0467	0714	0832	0935	0986	0028
36500	0000	0000	0000	0000	0000	0000	0000	0111	0226	0374	0467	0721	0839	0942	0993	0030
36800	0000	0000	0000	0000	0000	0000	0000	0118	0235	0383	0467	0728	0846	0949	1000	0032
37100	0000	0000	0000	0000	0000	0000	0000	0125	0244	0392	0467	0735	0853	0956	1007	0034
37400	0000	0000	0000	0000	0000	0000	0000	0132	0253	0401	0467	0742	0860	0963	1014	0036
37700	0000	0000	0000	0000	0000	0000	0000	0139	0262	0410	0467	0749	0867	0966	1021	0038
38000	0000	0000	0000	0000	0000	0000	0000	0146	0271	0419	0467	0756	0874	0977	1028	0040
38300	0000	0000	0000	0000	0000	0000	0000	0153	0280	0428	0467	0763	0881	0984	1035	0042
38600	0000	0000	0000	0000	0000	0000	0000	0160	0289	0437	0467	0770	0888	0991	1042	0044
38900	0000	0000	0000	0000	0000	0000	0000	0167	0298	0446	0467	0777	0895	0998	1049	0046
39200	0000	0000	0000	0000	0000	0000	0000	0174	0307	0455	0467	0784	0902	1005	1056	0048
39500	0000	0000	0000	0000	0000	0000	0000	0181	0316	0464	0467	0791	0909	1012	1063	0050
39800	0000	0000	0000	0000	0000	0000	0000	0188	0325	0473	0467	0798	0916	1019	1070	0052
40100	0000	0000	0000	0000	0000	0000	0000	0195	0334	0482	0467	0805	0923	1026	1077	0054
40400	0000	0000	0000	0000	0000	0000	0000	0202	0343	0491	0467	0812	0930	1033	1084	0056
40700	0000	0000	0000	0000	0000	0000	0000	0209	0352	0500	0467	0819	0937	1040	1091	0058
41000	0000	0000	0000	0000	0000	0000	0000	0216	0361	0509	0467	0826	0944	1047	1098	0060
41300	0000	0000	0000	0000	0000	0000	0000	0223	0370	0518	0467	0833	0951	1054	1105	0062
41600	0000	0000	0000	0000	0000	0000	0000	0230	0379	0527	0467	0840	0958	1061	1112	0064
41900	0000	0000	0000	0000	0000	0000	0000	0237	0388	0536	0467	0847	0965	1068	1119	0066
42200	0000	0000	0000	0000	0000	0000	0000	0244	0397	0545	0467	0854	0972	1075	1126	0068
42500	0000	0000	0000	0000	0000	0000	0000	0251	0406	0554	0467	0861	0979	1082	1133	0070
42800	0000	0000	0000	0000	0000	0000	0000	0258	0415	0563	0467	0868	0986	1089	1140	0072
43100	0000	0000	0000	0000	0000	0000	0000	0265	0424	0572	0467	0875	0993	1096	1147	0074
43400	0000	0000	0000	0000	0000	0000	0000	0272	0433	0581	0467	0882	1000	1103	1154	0076
43700	0000	0000	0000	0000	0000	0000	0000	0279	0442	0590	0467	0889	1007	1110	1161	0078
44000	0000	0000	0000	0000	0000	0000	0000	0286	0451	0599	0467	0896	1014	1117	1168	0080
44300	0000	0000	0000	0000	0000	0000	0000	0293	0460	0608	0467	0903	1021	1124	1175	0082
44600	0000	0000	0000	0000	0000	0000	0000	0300	0469	0617	0467	0910	1028	1131	1182	0084
44900	0000	0000	0000	0000	0000	0000	0000	0307	0478	0626	0467	0917	1035	1138	1189	0086
45200	0000	0000	0000	0000	0000	0000	0000	0314	0487	0635	0467	0924	1042	1145	1196	0088
45500	0000	0000	0000	0000	0000	0000	0000	0321	0496	0644	0467	0931	1049	1152	1203	0090
45800	0000	0000	0000	0000	0000	0000	0000	0328	0505	0653	0467	0938	1056	1159	1210	0092
46100	0000	0000	0000	0000	0000	0000	0000	0335	0514	0662	0467	0945	1063	1166	1217	0094
46400	0000	0000	0000	0000	0000	0000	0000	0342	0523	0671	0467	0952	1070	1173	1224	0096
46700	0000	0000	0000	0000	0000	0000	0000	0349	0532	0680	0467	0959	1077	1180	1231	0098
47000	0000	0000	0000	0000	0000	0000	0000	0356	0541	0689	0467	0966	1084	1187	1238	0100
47300	0000	0000	0000	0000	0000	0000	0000	0363	0550	0698	0467	0973	1091	1194	1245	0102
47600	0000	0000	0000	0000	0000	0000	0000	0370	0559	0707	0467	0980	1098	1201	1252	0104
47900	0000	0000	0000	0000	0000	0000	0000	0377	0568	0716	0467	0987	1105	1208	1259	0106
48200	0000	0000	0000	0000	0000	0000	0000	0384	0577	0725	0467	0994	1112	1215	1266	0108
48500	0000	0000	0000	0000	0000	0000	0000	0391	0586	0734	0467	1001	1119	1222	1273	0110
48800	0000	0000	0000	0000	0000	0000	0000	0398	0595	0743	0467	1008	1126	1229	1280	0112
49100	0000	0000	0000	0000	0000	0000	0000	0405	0604	0752	0467	1015	1133	1236	1287	0114
49400	0000	0000	0000	0000	0000	0000	0000	0412	0613	0761	0467	1022	1140	1243	1294	0116
49700	0000	0000	0000	0000	0000	0000	0000	0419	0622	0770	0467	1029	1147	1250	1301	0118
50000	0000	0000	0000	0000	0000	0000	0000	0426	0631	0779	0467	1036	1154	1257	1308	0120
50300	0000	0000	0000	0000	0000	0000	0000	0433	0640	0788	0467	1043	1161	1264	1315	0122
50600	0000	0000	0000	0000	0000	0000	0000	0440	0649	0797	0467	1050	1168	1271	1322	0124
50900	0000	0000	0000	0000	0000	0000	0000	0447	0658	0806	0467	1057	1175	1278	1329	0126
51200	0000	0000	0000	0000	0000	0000	0000	0454	0667	0815	0467	1064	1182	1285	1336	0128
51500	0000	0000	0000	0000	0000	0000	0000	0461	0676	0824	0467	1071	1189	1292	1343	0130
51800	0000	0000	0000	0000	0000	0000	0000	0468	0685	0833	0467	1078	1196	1299	1350	0132
52100	0000	0000	0000	0000	0000	0000	0000	0475	0694	0842	0467	1085	1203	1306	1357	0134
52400	0000	0000	0000	0000	0000	0000	0000	0482	0703	0851	0467	1092	1210	1313	1364	0136
52700	0000	0000	0000	0000	0000	0000	0000	0489	0712	0860	0467	1099	1217	1320	1371	0138
53000	0000	0000	0000	0000	0000	0000	0000	0496	0721	0869	0467	1106	1224	1327	1378	0140
53300	0000	0000	0000	0000	0000	0000	0000	0503	0730	0878	0467	1113	1231	1334	1385	0142
53600	0000	0000	0000	0000	0000	0000	0000	0510	0739	0887	0467	1120	1238	1341	1392	0144
53900	0000	0000	0000	0000	0000	0000	0000	0517	0748	0896	0467	1127	1245	1348	1399	0146
54200	0000	0000	0000	0000	0000	0000	0000	0524	0757	0905	0467	1134	1252	1355	1406	0148
54500	0000	0000	0000	0000	0000	0000	0000	0531	0766	0914	0467	1141	1259	1362	1413	0150
54800	0000	0000	0000	0000	0000	0000	0000									

B-48

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

PR (a)	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	U (PR, CM.)	R	ERROR
4120.	.061	.055	.227	.474	.745	.866	.939	.981	.993	.997	.999	1.000	1.000	1.000	1.000	.1618+00	.9600+00	.003
4130.	.062	.074	.271	.525	.765	.890	.953	.987	.995	.998	1.000	1.000	1.000	1.000	1.000	.1401+00	.9700+00	.005
4140.	.063	.084	.311	.563	.807	.922	.973	.990	.996	.999	1.000	1.000	1.000	1.000	1.000	.1163+00	.1000+01	.001
4150.	.064	.114	.346	.596	.826	.914	.964	.992	.997	1.000	1.000	1.000	1.000	1.000	1.000	.9826-01	.1030+01	.001
4160.	.066	.134	.371	.618	.830	.920	.967	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000	.9460-01	.1020+01	.001
4170.	.069	.156	.401	.642	.851	.927	.971	.994	.998	1.000	1.000	1.000	1.000	1.000	1.000	.8715-01	.1020+01	.001
4180.	.072	.173	.423	.663	.860	.932	.973	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	.8169-01	.1020+01	.001
4190.	.075	.189	.442	.673	.867	.936	.975	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	.7776-01	.1020+01	.001
4200.	.079	.208	.464	.689	.875	.941	.977	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	.7335-01	.1020+01	.002
4210.	.083	.227	.484	.704	.882	.945	.979	.995	.998	1.000	1.000	1.000	1.000	1.000	1.000	.6718-01	.1030+01	.001
4220.	.087	.242	.503	.716	.887	.949	.981	.996	.998	1.000	1.000	1.000	1.000	1.000	1.000	.6431-01	.1030+01	.001
4230.	.092	.259	.517	.729	.892	.953	.982	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	.6128-01	.1030+01	.001
4240.	.098	.279	.537	.743	.894	.957	.985	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	.5816-01	.1030+01	.001
4250.	.105	.297	.554	.755	.904	.960	.986	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	.5517-01	.1030+01	.001
4260.	.113	.313	.569	.765	.908	.962	.987	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.5098-01	.1040+01	.001
4270.	.124	.328	.583	.774	.912	.963	.988	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.5065-01	.1030+01	.001
4280.	.136	.343	.598	.787	.916	.965	.988	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.5065-01	.1030+01	.001
4290.	.149	.358	.610	.793	.920	.967	.988	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.5065-01	.1030+01	.001
4300.	.162	.373	.625	.802	.924	.969	.990	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4357-01	.1030+01	.000
4310.	.176	.389	.637	.809	.921	.971	.991	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4281-01	.1040+01	.001
4320.	.192	.409	.650	.817	.931	.973	.992	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.4118-01	.1040+01	.000
4330.	.208	.423	.661	.824	.934	.974	.992	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3609-01	.1050+01	.000
4340.	.225	.435	.671	.831	.936	.976	.992	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3395-01	.1070+01	.000
4350.	.243	.448	.680	.838	.939	.977	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3547-01	.1050+01	.000
4360.	.261	.455	.685	.841	.941	.977	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3423-01	.1050+01	.000
4370.	.279	.461	.691	.844	.942	.978	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3348-01	.1050+01	.000
4380.	.297	.467	.693	.845	.942	.978	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3276-01	.1050+01	.001
4390.	.315	.470	.693	.844	.942	.978	.993	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.3341-01	.1040+01	.000
4400.	.333	.470	.690	.841	.941	.977	.991	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3298-01	.1040+01	.000
4410.	.351	.466	.672	.825	.932	.971	.988	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	.3405-01	.1030+01	.000
4420.	.369	.464	.667	.820	.928	.969	.986	.995	.998	.999	1.000	1.000	1.000	1.000	1.000	.3896-01	.1000+01	.000
4430.	.387	.464	.661	.811	.920	.963	.983	.993	.997	.999	1.000	1.000	1.000	1.000	1.000	.4173-01	.9800+00	.000
4440.	.405	.467	.656	.789	.905	.953	.977	.991	.996	.998	.999	1.000	1.000	1.000	1.000	.4515-01	.9600+00	.000
4450.	.423	.471	.651	.773	.893	.944	.971	.984	.994	.997	.999	1.000	1.000	1.000	1.000	.5266-01	.9300+00	.000
4460.	.441	.473	.645	.741	.864	.926	.959	.982	.991	.995	.998	.999	1.000	1.000	1.000	.5847-01	.9100+00	.000
4470.	.459	.475	.638	.741	.864	.926	.959	.982	.991	.995	.998	.999	1.000	1.000	1.000	.7186-01	.8700+00	.000
4480.	.477	.481	.631	.735	.854	.916	.949	.977	.984	.994	.998	.999	1.000	1.000	1.000	.8784-01	.8400+00	.001
4490.	.495	.485	.624	.728	.845	.907	.940	.969	.984	.991	.997	.998	.999	1.000	1.000	.1034+00	.8100+00	.001

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

Iteration	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.030	0.031	0.032	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.040	0.041	0.042	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.050	0.051	0.052	0.053	0.054	0.055	0.056	0.057	0.058	0.059	0.060	0.061	0.062	0.063	0.064	0.065	0.066	0.067	0.068	0.069	0.070	0.071	0.072	0.073	0.074	0.075	0.076	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084	0.085	0.086	0.087	0.088	0.089	0.090	0.091	0.092	0.093	0.094	0.095	0.096	0.097	0.098	0.099	0.100	0.101	0.102	0.103	0.104	0.105	0.106	0.107	0.108	0.109	0.110	0.111	0.112	0.113	0.114	0.115	0.116	0.117	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.129	0.130	0.131	0.132	0.133	0.134	0.135	0.136	0.137	0.138	0.139	0.140	0.141	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.149	0.150	0.151	0.152	0.153	0.154	0.155	0.156	0.157	0.158	0.159	0.160	0.161	0.162	0.163	0.164	0.165	0.166	0.167	0.168	0.169	0.170	0.171	0.172	0.173	0.174	0.175	0.176	0.177	0.178	0.179	0.180	0.181	0.182	0.183	0.184	0.185	0.186	0.187	0.188	0.189	0.190	0.191	0.192	0.193	0.194	0.195	0.196	0.197	0.198	0.199	0.200	0.201	0.202	0.203	0.204	0.205	0.206	0.207	0.208	0.209	0.210	0.211	0.212	0.213	0.214	0.215	0.216	0.217	0.218	0.219	0.220	0.221	0.222	0.223	0.224	0.225	0.226	0.227	0.228	0.229	0.230	0.231	0.232	0.233	0.234	0.235	0.236	0.237	0.238	0.239	0.240	0.241	0.242	0.243	0.244	0.245	0.246	0.247	0.248	0.249	0.250	0.251	0.252	0.253	0.254	0.255	0.256	0.257	0.258	0.259	0.260	0.261	0.262	0.263	0.264	0.265	0.266	0.267	0.268	0.269	0.270	0.271	0.272	0.273	0.274	0.275	0.276	0.277	0.278	0.279	0.280	0.281	0.282	0.283	0.284	0.285	0.286	0.287	0.288	0.289	0.290	0.291	0.292	0.293	0.294	0.295	0.296	0.297	0.298	0.299	0.300	0.301	0.302	0.303	0.304	0.305	0.306	0.307	0.308	0.309	0.310	0.311	0.312	0.313	0.314	0.315	0.316	0.317	0.318	0.319	0.320	0.321	0.322	0.323	0.324	0.325	0.326	0.327	0.328	0.329	0.330	0.331	0.332	0.333	0.334	0.335	0.336	0.337	0.338	0.339	0.340	0.341	0.342	0.343	0.344	0.345	0.346	0.347	0.348	0.349	0.350	0.351	0.352	0.353	0.354	0.355	0.356	0.357	0.358	0.359	0.360	0.361	0.362	0.363	0.364	0.365	0.366	0.367	0.368	0.369	0.370
0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.030	0.031	0.032	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.040	0.041	0.042	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.050	0.051	0.052	0.053	0.054	0.055	0.056	0.057	0.058	0.059	0.060	0.061	0.062	0.063	0.064	0.065	0.066	0.067	0.068	0.069	0.070	0.071	0.072	0.073	0.074	0.075	0.076	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084	0.085	0.086	0.087	0.088	0.089	0.090	0.091	0.092	0.093	0.094	0.095	0.096	0.097	0.098	0.099	0.100	0.101	0.102	0.103	0.104	0.105	0.106	0.107	0.108	0.109	0.110	0.111	0.112	0.113	0.114	0.115	0.116	0.117	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.129	0.130	0.131	0.132	0.133	0.134	0.135	0.136	0.137	0.138	0.139	0.140	0.141	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.149	0.150	0.151	0.152	0.153	0.154	0.155	0.156	0.157	0.158	0.159	0.160	0.161	0.162	0.163	0.164	0.165	0.166	0.167	0.168	0.169	0.170	0.171	0.172	0.173	0.174	0.175	0.176	0.177	0.178	0.179	0.180	0.181	0.182	0.183	0.184	0.185	0.186	0.187	0.188	0.189	0.190	0.191	0.192	0.193	0.194	0.195	0.196	0.197	0.198	0.199	0.200	0.201	0.202	0.203	0.204	0.205	0.206	0.207	0.208	0.209	0.210	0.211	0.212	0.213	0.214	0.215	0.216	0.217	0.218	0.219	0.220	0.221	0.222	0.223	0.224	0.225	0.226	0.227	0.228	0.229	0.230	0.231	0.232	0.233	0.234	0.235	0.236	0.237	0.238	0.239	0.240	0.241	0.242	0.243	0.244	0.245	0.246	0.247	0.248	0.249	0.250	0.251	0.252	0.253	0.254	0.255	0.256	0.257	0.258	0.259	0.260	0.261	0.262	0.263	0.264	0.265	0.266	0.267	0.268	0.269	0.270	0.271	0.272	0.273	0.274	0.275	0.276	0.277	0.278	0.279	0.280	0.281	0.282	0.283	0.284	0.285	0.286	0.287	0.288	0.289	0.290	0.291	0.292	0.293	0.294	0.295	0.296	0.297	0.298	0.299	0.300	0.301	0.302	0.303	0.304	0.305	0.306	0.307	0.308	0.309	0.310	0.311	0.312	0.313	0.314	0.315	0.316	0.317	0.318	0.319	0.320	0.321	0.322	0.323	0.324	0.325	0.326	0.327	0.328	0.329	0.330	0.331	0.332	0.333	0.334	0.335	0.336	0.337	0.338	0.339	0.340	0.341	0.342	0.343	0.344	0.345	0.346	0.347	0.348	0.349	0.350	0.351	0.352	0.353	0.354	0.355	0.356	0.357	0.358	0.359	0.360	0.361	0.362	0.363	0.364	0.365	0.366	0.367	0.368	0.369	0.370	
0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.030	0.031	0.032	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.040	0.041	0.042	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.050	0.051	0.052	0.053	0.054	0.055	0.056	0.057	0.058	0.059	0.060	0.061	0.062	0.063	0.064	0.065	0.066	0.067	0.068	0.069	0.070	0.071	0.072	0.073	0.074	0.075	0.076	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084	0.085	0.086	0.087	0.088	0.089	0.090	0.091	0.092	0.093	0.094	0.095	0.096	0.097	0.098	0.099	0.100	0.101	0.102	0.103	0.104	0.105	0.106	0.107	0.108	0.109	0.110	0.111	0.112	0.113	0.114	0.115	0.116	0.117	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.129	0.130	0.131	0.132	0.133	0.134	0.135	0.136	0.137	0.138	0.139	0.140	0.141	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.149	0.150	0.151	0.152	0.153	0.154	0.155	0.156	0.157	0.158	0.159	0.160	0.161	0.162	0.163	0.164	0.165	0.166	0.167	0.168	0.169	0.170	0.171	0.172	0.173	0.174	0.175	0.176	0.177	0.178	0.179	0.180	0.181	0.182	0.183	0.184	0.185	0.186	0.187	0.188	0.189	0.190	0.191	0.192	0.193	0.194	0.195	0.196	0.197	0.198	0.199	0.200	0.201	0.202	0.203	0.204	0.205	0.206	0.207	0.208	0.209	0.210	0.211	0.212	0.213	0.214	0.215	0.216	0.217	0.218	0.219	0.220	0.221	0.222	0.223	0.224	0.225	0.226	0.227	0.228	0.229	0.230	0.231	0.232	0.233	0.234	0.235	0.236	0.237	0.238	0.239	0.240	0.241	0.242	0.243	0.244	0.245	0.246	0.247	0.248	0.249	0.250	0.251	0.252	0.253	0.254	0.255	0.256	0.257	0.258	0.259	0.260	0.261	0.262	0.263	0.264	0.265	0.266	0.267	0.268	0.269	0.270	0.271	0.272	0.273	0.274	0.275	0.276	0.277	0.278	0.279	0.280	0.281	0.282	0.283	0.284	0.285	0.286	0.287	0.288	0.289	0.290	0.291	0.292	0.293	0.294	0.295	0.296	0.297	0.298	0.299	0.300	0.301	0.302	0.303	0.304	0.305	0.306	0.307	0.308	0.309	0.310	0.311	0.312	0.313	0.314	0.315	0.316	0.317	0.318	0.319	0.320	0.321	0.322	0.323	0.324	0.325	0.326	0.327	0.328	0.329	0.330	0.331	0.332	0.333	0.334	0.335	0.336	0.337	0.338	0.339	0.340	0.341	0.342	0.343	0.344	0.345	0.346	0.347	0.348	0.349	0.350	0.351	0.352	0.353	0.354	0.355	0.356	0.357	0.358	0.359	0.360	0.361	0.362	0.363	0.364	0.365	0.366	0.367	0.368	0.369	0.370	
0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.030	0.031	0.032	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.040	0.041	0.042	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.050	0.051	0.052	0.053	0.054	0.055	0.056	0.057	0.058	0.059	0.060	0.061	0.062	0.063	0.064	0.065	0.066	0.067	0.068	0.069	0.070	0.071	0.072	0.073	0.074	0.075	0.076	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084	0.085	0.086	0.087	0.088	0.089	0.090	0.091	0.092	0.093	0.094	0.095	0.096	0.097	0.098	0.099	0.100	0.101	0.102	0.103	0.104	0.105	0.106	0.107	0.108	0.109	0.110	0.111	0.112	0.113	0.114	0.115	0.116	0.117	0.118	0.119	0.120	0.121	0.122																																																																																																																																																																																																																																																									

UNCLASSIFIED



WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

PR.	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790	800	810	820	830	840	850	860	870	880	890	900	910	920	930	940	950	960	970	980	990	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190	1200	1210	1220	1230	1240	1250	1260	1270	1280	1290	1300	1310	1320	1330	1340	1350	1360	1370	1380	1390	1400	1410	1420	1430	1440	1450	1460	1470	1480	1490	1500	1510	1520	1530	1540	1550	1560	1570	1580	1590	1600	1610	1620	1630	1640	1650	1660	1670	1680	1690	1700	1710	1720	1730	1740	1750	1760	1770	1780	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100	2110	2120	2130	2140	2150	2160	2170	2180	2190	2200	2210	2220	2230	2240	2250	2260	2270	2280	2290	2300	2310	2320	2330	2340	2350	2360	2370	2380	2390	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500	2510	2520	2530	2540	2550	2560	2570	2580	2590	2600	2610	2620	2630	2640	2650	2660	2670	2680	2690	2700	2710	2720	2730	2740	2750	2760	2770	2780	2790	2800	2810	2820	2830	2840	2850	2860	2870	2880	2890	2900	2910	2920	2930	2940	2950	2960	2970	2980	2990	3000	3010	3020	3030	3040	3050	3060	3070	3080	3090	3100	3110	3120	3130	3140	3150	3160	3170	3180	3190	3200	3210	3220	3230	3240	3250	3260	3270	3280	3290	3300	3310	3320	3330	3340	3350	3360	3370	3380	3390	3400	3410	3420	3430	3440	3450	3460	3470	3480	3490	3500	3510	3520	3530	3540	3550	3560	3570	3580	3590	3600	3610	3620	3630	3640	3650	3660	3670	3680	3690	3700	3710	3720	3730	3740	3750	3760	3770	3780	3790	3800	3810	3820	3830	3840	3850	3860	3870	3880	3890	3900	3910	3920	3930	3940	3950	3960	3970	3980	3990	4000	4010	4020	4030	4040	4050	4060	4070	4080	4090	4100	4110	4120	4130	4140	4150	4160	4170	4180	4190	4200	4210	4220	4230	4240	4250	4260	4270	4280	4290	4300	4310	4320	4330	4340	4350	4360	4370	4380	4390	4400	4410	4420	4430	4440	4450	4460	4470	4480	4490	4500	4510	4520	4530	4540	4550	4560	4570	4580	4590	4600	4610	4620	4630	4640	4650	4660	4670	4680	4690	4700	4710	4720	4730	4740	4750	4760	4770	4780	4790	4800	4810	4820	4830	4840	4850	4860	4870	4880	4890	4900	4910	4920	4930	4940	4950	4960	4970	4980	4990	5000	5010	5020	5030	5040	5050	5060	5070	5080	5090	5100	5110	5120	5130	5140	5150	5160	5170	5180	5190	5200	5210	5220	5230	5240	5250	5260	5270	5280	5290	5300	5310	5320	5330	5340	5350	5360	5370	5380	5390	5400	5410	5420	5430	5440	5450	5460	5470	5480	5490	5500	5510	5520	5530	5540	5550	5560	5570	5580	5590	5600	5610	5620	5630	5640	5650	5660	5670	5680	5690	5700	5710	5720	5730	5740	5750	5760	5770	5780	5790	5800	5810	5820	5830	5840	5850	5860	5870	5880	5890	5900	5910	5920	5930	5940	5950	5960	5970	5980	5990	6000	6010	6020	6030	6040	6050	6060	6070	6080	6090	6100	6110	6120	6130	6140	6150	6160	6170	6180	6190	6200	6210	6220	6230	6240	6250	6260	6270	6280	6290	6300	6310	6320	6330	6340	6350	6360	6370	6380	6390	6400	6410	6420	6430	6440	6450	6460	6470	6480	6490	6500	6510	6520	6530	6540	6550	6560	6570	6580	6590	6600	6610	6620	6630	6640	6650	6660	6670	6680	6690	6700	6710	6720	6730	6740	6750	6760	6770	6780	6790	6800	6810	6820	6830	6840	6850	6860	6870	6880	6890	6900	6910	6920	6930	6940	6950	6960	6970	6980	6990	7000	7010	7020	7030	7040	7050	7060	7070	7080	7090	7100	7110	7120	7130	7140	7150	7160	7170	7180	7190	7200	7210	7220	7230	7240	7250	7260	7270	7280	7290	7300	7310	7320	7330	7340	7350	7360	7370	7380	7390	7400	7410	7420	7430	7440	7450	7460	7470	7480	7490	7500	7510	7520	7530	7540	7550	7560	7570	7580	7590	7600	7610	7620	7630	7640	7650	7660	7670	7680	7690	7700	7710	7720	7730	7740	7750	7760	7770	7780	7790	7800	7810	7820	7830	7840	7850	7860	7870	7880	7890	7900	7910	7920	7930	7940	7950	7960	7970	7980	7990	8000	8010	8020	8030	8040	8050	8060	8070	8080	8090	8100	8110	8120	8130	8140	8150	8160	8170	8180	8190	8200	8210	8220	8230	8240	8250	8260	8270	8280	8290	8300	8310	8320	8330	8340	8350	8360	8370	8380	8390	8400	8410	8420	8430	8440	8450	8460	8470	8480	8490	8500	8510	8520	8530	8540	8550	8560	8570	8580	8590	8600	8610	8620	8630	8640	8650	8660	8670	8680	8690	8700	8710	8720	8730	8740	8750	8760	8770	8780	8790	8800	8810	8820	8830	8840	8850	8860	8870	8880	8890	8900	8910	8920	8930	8940	8950	8960	8970	8980	8990	9000	9010	9020	9030	9040	9050	9060	9070	9080	9090	9100	9110	9120	9130	9140	9150	9160	9170	9180	9190	9200	9210	9220	9230	9240	9250	9260	9270	9280	9290	9300	9310	9320	9330	9340	9350	9360	9370	9380	9390	9400	9410	9420	9430	9440	9450	9460	9470	9480	9490	9500	9510	9520	9530	9540	9550	9560	9570	9580	9590	9600	9610	9620	9630	9640	9650	9660	9670	9680	9690	9700	9710	9720	9730	9740	9750	9760	9770	9780	9790	9800	9810	9820	9830	9840	9850	9860	9870	9880	9890	9900	9910	9920	9930	9940	9950	9960	9970	9980	9990	10000	10010	10020	10030	10040	10050	10060	10070	10080	10090	10100	10110	10120	10130	10140	10150	10160	10170	10180	10190	1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UNCLASSIFIED



WATER VAPOR 1.00 ATMOSPHERE PRESSURE																
T=300 K																
TEMP	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	ERROR
32.00	.000	.000	.000	.000	.002	.020	.079	.227	.369	.511	.673	.767	.840	.908	.943	.024
32.50	.000	.000	.000	.000	.001	.014	.066	.205	.341	.443	.651	.752	.829	.901	.938	.073
33.00	.000	.000	.000	.000	.001	.016	.074	.228	.372	.514	.674	.766	.837	.903	.938	.069
33.50	.000	.000	.000	.000	.001	.011	.054	.188	.332	.482	.650	.743	.821	.891	.929	.060
34.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
34.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
35.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
35.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
36.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
36.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
37.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
37.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
38.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
38.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
39.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
39.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
40.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
40.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
41.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
41.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
42.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
42.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
43.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
43.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
44.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
44.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
45.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
45.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
46.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
46.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
47.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
47.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
48.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
48.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
49.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
49.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
50.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
50.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
51.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
51.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
52.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
52.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
53.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
53.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
54.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
54.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
55.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
55.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
56.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
56.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
57.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
57.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
58.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
58.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
59.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
59.50	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060
60.00	.000	.000	.000	.000	.001	.016	.070	.217	.368	.521	.690	.784	.851	.912	.944	.060

B-52

UNCLASSIFIED

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE T=300 K																U (PR. CM.)		B		Error
FREQ.	50.00	20.00	10.00	5.000	2.000	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	A	B			
5000.	001	016	081	198	393	538	606	795	868	921	964	981	990	996	998	6169+00	6200+00	006		
5010.	002	031	105	222	410	551	675	803	876	928	968	984	992	996	998	5482+00	6200+00	008		
5020.	002	037	122	254	457	603	728	849	912	951	979	989	995	998	999	4670+00	6600+00	013		
5030.	002	039	124	254	458	604	736	860	920	957	982	991	995	998	999	4493+00	6700+00	022		
5040.	004	051	150	294	507	659	782	893	942	970	987	994	997	999	999	4164+00	6600+00	035		
5050.	035	144	279	425	612	735	831	917	955	976	990	995	998	999	1.000	3099+00	6100+00	055		
5060.	081	237	414	584	763	859	919	964	981	990	996	998	999	1.000	1.000	1850+00	6100+00	079		
5070.	100	310	496	663	822	900	945	976	987	994	997	999	999	1.000	1.000	1228+00	7000+00	091		
5080.	133	342	552	744	880	938	968	987	993	997	999	999	1.000	1.000	1.000	9665+01	7000+00	014		
5090.	124	358	555	717	859	923	958	983	991	996	998	999	1.000	1.000	1.000	9311+01	7000+00	091		
5100.	106	322	508	667	816	890	937	972	985	993	997	998	999	1.000	1.000	1195+00	7000+00	098		
5110.	115	331	515	671	817	889	936	971	985	992	997	998	999	1.000	1.000	1199+00	7000+00	088		
5120.	130	359	546	700	840	906	947	977	988	994	997	999	999	1.000	1.000	1043+00	7600+00	098		
5130.	140	364	544	696	835	902	945	976	988	994	997	999	999	1.000	1.000	1091+00	7600+00	091		
5140.	175	413	590	724	855	914	952	979	989	994	998	999	999	1.000	1.000	9635+01	7600+00	090		
5150.	214	459	625	754	869	922	957	981	990	995	998	999	999	1.000	1.000	8519+01	7600+00	090		
5160.	257	512	678	800	902	945	971	988	994	997	999	999	1.000	1.000	1.000	6429+01	7800+00	090		
5170.	220	400	631	771	865	915	965	985	992	996	999	999	1.000	1.000	1.000	9621+01	7100+00	018		
5180.	253	509	674	797	902	966	971	988	994	997	999	999	1.000	1.000	1.000	6269+01	7000+00	081		
5190.	252	501	669	789	898	962	969	987	993	997	999	999	1.000	1.000	1.000	6794+01	7700+00	083		
5200.	344	616	770	865	940	968	984	993	997	998	999	999	1.000	1.000	1.000	3552+01	8700+00	090		
5210.	349	615	764	867	943	971	985	996	997	998	999	999	1.000	1.000	1.000	3650+01	8600+00	089		
5220.	358	622	776	874	948	974	987	995	997	999	999	999	1.000	1.000	1.000	3627+01	8700+00	088		
5230.	406	644	808	897	959	980	990	996	998	999	1.000	1.000	1.000	1.000	1.000	3024+01	8700+00	082		
5240.	502	756	871	936	977	989	995	998	999	999	1.000	1.000	1.000	1.000	1.000	1380+01	1000+01	089		
5250.	476	736	854	929	975	988	994	998	999	999	1.000	1.000	1.000	1.000	1.000	1607+01	9800+00	086		
5260.	434	713	846	922	970	986	993	997	999	999	1.000	1.000	1.000	1.000	1.000	1853+01	9500+00	090		
5270.	447	701	835	915	965	985	992	996	998	999	1.000	1.000	1.000	1.000	1.000	2126+01	9300+00	090		
5280.	446	666	810	900	960	981	990	996	998	999	1.000	1.000	1.000	1.000	1.000	2576+01	9100+00	090		
5290.	534	768	873	941	978	990	995	998	999	999	1.000	1.000	1.000	1.000	1.000	2304+01	9100+00	080		
5300.	507	807	903	954	983	993	997	999	999	1.000	1.000	1.000	1.000	1.000	1.000	1361+01	9000+00	088		
5310.	593	775	877	937	974	988	994	998	999	999	1.000	1.000	1.000	1.000	1.000	9872+02	1600+01	080		
5320.	559	774	876	935	973	988	994	998	999	999	1.000	1.000	1.000	1.000	1.000	1952+01	8600+00	081		
5330.	520	739	847	914	962	981	990	996	998	999	1.000	1.000	1.000	1.000	1.000	1595+01	8200+00	088		
5340.	508	728	838	908	959	979	989	996	998	999	1.000	1.000	1.000	1.000	1.000	2266+01	8600+00	080		
5350.	468	690	806	864	945	971	985	994	997	998	999	1.000	1.000	1.000	1.000	2537+01	8400+00	080		
5360.	468															3458+01	7900+00	080		

B-53

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WATER VAPOR 1.00 ATMOSPHERIC PRESSURE
T=300 K

FILE NO.	20.00	10.00	5.000	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	U (PR, CM.)	A	R	ERROR
5371.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.96	4.98	4.99	1.000	1.000	1.000	3870-01	7800+00	.000
5372.	4.44	4.71	7.63	4.74	4.54	4.66	4.70	4.87	4.94	4.97	4.99	1.000	1.000	1.000	4649-01	7600+00	.000
5373.	4.44	4.71	7.63	4.74	4.54	4.67	4.91	4.84	4.94	4.97	4.99	1.000	1.000	1.000	6022-01	7300+00	.001
5374.	4.44	4.74	7.65	4.97	4.75	4.84	4.94	4.92	4.96	4.98	4.99	1.000	1.000	1.000	6788-01	7100+00	.000
5375.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	7006-01	7100+00	.000
5376.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	8003-01	6900+00	.006
5377.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	8543-01	6700+00	.001
5378.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	8265-01	6800+00	.000
5379.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	5667-01	7300+00	.000
5380.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	4774-01	7400+00	.000
5381.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	4027-01	7600+00	.003
5382.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	2800-01	8200+00	.000
5383.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	7410-01	8400+00	.001
5384.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1727+00	7600+00	.003
5385.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1674+00	6200+00	.027
5386.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1179+00	6200+00	.001
5387.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1149+00	6100+00	.001
5388.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	2785-01	8600+00	.001
5389.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	3160-01	7600+00	.000
5390.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1256+00	5700+00	.002
5391.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1372+00	6000+00	.002
5392.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	4945-01	7600+00	.000
5393.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	4894-01	7400+00	.000
5394.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	4369-01	7600+00	.002
5395.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	6110-01	7100+00	.000
5396.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1180+00	6200+00	.001
5397.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1760+00	5700+00	.004
5398.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1792+00	6000+00	.002
5399.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	7968-01	7300+00	.000
5400.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	7710-01	7300+00	.000
5401.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	9327-01	7100+00	.000
5402.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1191+00	6800+00	.003
5403.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1342+00	6500+00	.003
5404.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	8092-01	7300+00	.001
5405.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	1259+00	6800+00	.006
5406.	4.44	4.71	7.63	4.74	4.54	4.68	4.93	4.91	4.95	4.98	4.99	1.000	1.000	1.000	2604+00	5900+00	.015

B-54

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WATER VAPOR 1.00 ATMOSPHERIC PRESSURE
T=300 K

[illegible]

B-55

UNCLASSIFIED

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OUTER VACUUM 1.00 ATMOSPHERIC PRESSURE
T=300 K

 $T = 300 \text{ K}$

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B-56

UNCLASSIFIED

UNCLASSIFIED

[illegible]

B-57

UNCLASSIFIED

UNCLASSIFIED



WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

[illegible]

UNCLASSIFIED

UNCLASSIFIED



WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	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UNCLASSIFIED

UNCLASSIFIED



WATER VAPOR 1.00 ATMOSPHERIC PRESSURE
T=300 K

[illegible]

B-60

UNCLASSIFIED

UNCLASSIFIED



WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=300 K

FREQ.	50.00	20.00	10.00	5.00	2.00	1.00	0.50	0.20	0.10	0.05	0.02	0.01	U (PR, CM.)	A	R	ERROR
8560.	.428	.434	.440	.446	.450	.454	.457	.460	.463	.465	.467	.468	.1634+00	.5600+00	.005	
8570.	.431	.437	.442	.447	.451	.454	.457	.460	.463	.465	.467	.468	.1472+00	.5400+00	.004	
8580.	.434	.440	.445	.449	.453	.456	.459	.462	.465	.467	.468	.469	.1437+00	.5700+00	.003	
8590.	.437	.443	.448	.452	.456	.459	.462	.465	.468	.470	.471	.472	.1640+00	.5500+00	.004	
8600.	.441	.447	.452	.456	.460	.463	.466	.469	.472	.474	.475	.476	.2118+00	.5700+00	.006	
8610.	.444	.450	.455	.459	.463	.466	.469	.472	.475	.477	.478	.479	.1607+00	.5700+00	.006	
8620.	.447	.453	.458	.462	.466	.469	.472	.475	.478	.480	.481	.482	.2013+00	.5600+00	.004	
8630.	.450	.456	.461	.465	.469	.472	.475	.478	.481	.483	.484	.485	.2752+00	.5600+00	.014	
8640.	.454	.460	.465	.469	.473	.476	.479	.482	.485	.487	.488	.489	.2358+00	.6000+00	.031	
8650.	.457	.463	.468	.472	.476	.479	.482	.485	.488	.490	.491	.492	.2430+00	.6000+00	.031	
8660.	.460	.466	.471	.475	.479	.482	.485	.488	.491	.493	.494	.495	.2578+00	.6100+00	.065	
8670.	.463	.469	.474	.478	.482	.485	.488	.491	.494	.496	.497	.498	.2383+00	.6100+00	.065	
8680.	.466	.472	.477	.481	.485	.488	.491	.494	.497	.499	.500	.501	.3426+00	.5700+00	.065	
8690.	.469	.475	.480	.484	.488	.491	.494	.497	.500	.502	.503	.504	.3621+00	.5800+00	.065	
8700.	.472	.478	.483	.487	.491	.494	.497	.500	.503	.505	.506	.507	.3146+00	.6000+00	.003	
8710.	.475	.481	.486	.490	.494	.497	.500	.503	.506	.508	.509	.510	.3336+00	.6000+00	.003	
8720.	.478	.484	.489	.493	.497	.500	.503	.506	.509	.511	.512	.513	.3008+00	.6100+00	.002	
8730.	.481	.487	.492	.496	.500	.503	.506	.509	.512	.514	.515	.516	.3011+00	.6400+00	.001	
8740.	.484	.490	.495	.499	.503	.506	.509	.512	.515	.517	.518	.519	.2735+00	.6500+00	.001	
8750.	.487	.493	.498	.502	.506	.509	.512	.515	.518	.520	.521	.522	.2355+00	.6100+00	.006	
8760.	.490	.496	.501	.505	.509	.512	.515	.518	.521	.523	.524	.525	.2385+00	.6200+00	.001	
8770.	.493	.499	.504	.508	.512	.515	.518	.521	.524	.526	.527	.528	.2728+00	.6300+00	.001	
8780.	.496	.502	.507	.511	.515	.518	.521	.524	.527	.529	.530	.531	.3920+00	.5900+00	.004	
8790.	.499	.505	.510	.514	.518	.521	.524	.527	.530	.532	.533	.534	.3920+00	.5900+00	.004	
8800.	.502	.508	.513	.517	.521	.524	.527	.530	.533	.535	.536	.537	.7128+00	.5800+00	.010	
8810.	.505	.511	.516	.520	.524	.527	.530	.533	.536	.538	.539	.540	.1230+01	.4900+00	.032	
8820.	.508	.514	.519	.523	.527	.530	.533	.536	.539	.541	.542	.543	.1147+01	.5000+00	.025	
8830.	.511	.517	.522	.526	.530	.533	.536	.539	.542	.544	.545	.546	.3329+00	.5700+00	.009	
8840.	.514	.520	.525	.529	.533	.536	.539	.542	.545	.547	.548	.549	.3329+00	.5900+00	.009	
8850.	.517	.523	.528	.532	.536	.539	.542	.545	.548	.550	.551	.552	.2402+00	.6600+00	.018	
8860.	.520	.526	.531	.535	.539	.542	.545	.548	.551	.553	.554	.555	.2682+00	.6100+00	.013	
8870.	.523	.529	.534	.538	.542	.545	.548	.551	.554	.556	.557	.558	.2439+00	.6100+00	.001	
8880.	.526	.532	.537	.541	.545	.548	.551	.554	.557	.559	.560	.561	.3176+00	.5600+00	.002	
8890.	.529	.535	.540	.544	.548	.551	.554	.557	.560	.562	.563	.564	.3961+00	.6000+00	.002	
8900.	.532	.538	.543	.547	.551	.554	.557	.560	.563	.565	.566	.567	.3283+00	.6300+00	.001	
8910.	.535	.541	.546	.550	.554	.557	.560	.563	.566	.568	.569	.570	.3460+00	.6200+00	.001	

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WATER VAPOR 1.00 ATMOSPHERE PRESSURE
T=100 K

FILE#	00.00	20.00	40.00	60.00	80.00	1.000	0.500	0.200	0.100	0.050	0.020	0.010	0.005	0.002	0.001	A	R	ERROR
4300.	895	810	871	815	754	874	866	894	897	898	899	1.000	1.000	1.000	1.000	3125-01	6300+00	.000
4310.	859	804	804	842	871	884	892	897	898	899	1.000	1.000	1.000	1.000	1.000	2017-01	6700+00	.000
4320.	759	851	802	837	868	882	891	895	898	899	1.000	1.000	1.000	1.000	1.000	2241-01	6500+00	.000
4330.	774	862	808	840	883	891	896	898	899	1.000	1.000	1.000	1.000	1.000	1.000	2196-01	6500+00	.000
4340.	701	853	802	836	867	882	890	896	898	899	1.000	1.000	1.000	1.000	1.000	2344-01	6500+00	.000
4350.	845	803	841	864	891	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1525-01	5700+00	.000
4360.	833	801	834	863	887	891	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1299-01	6800+00	.000
4370.	834	844	857	881	892	896	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	8301-02	7700+00	.000
4380.	839	831	858	876	889	894	897	899	899	1.000	1.000	1.000	1.000	1.000	1.000	8114-02	7100+00	.000
4390.	842	830	863	879	891	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	6920-02	7800+00	.000
4400.	847	834	868	891	897	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	7576-02	7100+00	.000
4410.	849	845	861	890	896	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2770-02	8400+00	.000
4420.	851	861	867	883	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2868-02	8600+00	.000
4430.	856	862	871	885	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	9362-03	9900+00	.000
4440.	859	864	874	889	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	9434-03	1000+01	.000
4450.	861	867	877	891	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1090-02	9800+00	.000
4460.	863	869	878	892	896	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1462-02	9200+00	.000
4470.	865	871	881	891	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2481-02	8400+00	.000
4480.	867	873	883	891	895	898	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1568-02	1040+01	.000
4490.	869	875	885	893	897	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1272-02	9300+00	.000
4500.	871	877	887	895	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2391-02	9100+00	.000
4510.	873	879	889	897	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1612-02	9500+00	.000
4520.	875	881	891	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1620-02	9800+00	.000
4530.	877	883	893	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	3756-02	7400+00	.000
4540.	879	885	895	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2200-02	9200+00	.000
4550.	881	887	897	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	4422-02	8400+00	.000
4560.	883	889	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	4853-02	8300+00	.000
4570.	885	891	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	3803-02	8400+00	.000
4580.	887	893	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	196-02	7800+00	.000
4590.	889	895	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	196-02	7800+00	.000
4600.	891	897	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1173-01	7400+00	.000
4610.	893	899	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1062-01	8500+00	.000
4620.	895	899	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	9657-02	7600+00	.000
4630.	897	899	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	9551-02	7600+00	.000
4640.	899	899	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1059-01	7500+00	.000
4650.	899	899	899	899	899	899	899	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	8533-02	7500+00	.000

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WATER VAPOR 1.00 ATMOSPHERIC PRESSURE
T=400 K

DATE	TIME	UT (PR. CH.)	A	R	ERROR
1964	00.00	0.000	0.000	0.000	0.000
1964	00.01	0.001	0.000	0.000	0.000
1964	00.02	0.002	0.000	0.000	0.000
1964	00.03	0.003	0.000	0.000	0.000
1964	00.04	0.004	0.000	0.000	0.000
1964	00.05	0.005	0.000	0.000	0.000
1964	00.06	0.006	0.000	0.000	0.000
1964	00.07	0.007	0.000	0.000	0.000
1964	00.08	0.008	0.000	0.000	0.000
1964	00.09	0.009	0.000	0.000	0.000
1964	00.10	0.010	0.000	0.000	0.000
1964	00.11	0.011	0.000	0.000	0.000
1964	00.12	0.012	0.000	0.000	0.000
1964	00.13	0.013	0.000	0.000	0.000
1964	00.14	0.014	0.000	0.000	0.000
1964	00.15	0.015	0.000	0.000	0.000
1964	00.16	0.016	0.000	0.000	0.000
1964	00.17	0.017	0.000	0.000	0.000
1964	00.18	0.018	0.000	0.000	0.000
1964	00.19	0.019	0.000	0.000	0.000
1964	00.20	0.020	0.000	0.000	0.000
1964	00.21	0.021	0.000	0.000	0.000
1964	00.22	0.022	0.000	0.000	0.000
1964	00.23	0.023	0.000	0.000	0.000
1964	00.24	0.024	0.000	0.000	0.000
1964	00.25	0.025	0.000	0.000	0.000
1964	00.26	0.026	0.000	0.000	0.000
1964	00.27	0.027	0.000	0.000	0.000
1964	00.28	0.028	0.000	0.000	0.000
1964	00.29	0.029	0.000	0.000	0.000
1964	00.30	0.030	0.000	0.000	0.000
1964	00.31	0.031	0.000	0.000	0.000
1964	00.32	0.032	0.000	0.000	0.000
1964	00.33	0.033	0.000	0.000	0.000
1964	00.34	0.034	0.000	0.000	0.000
1964	00.35	0.035	0.000	0.000	0.000
1964	00.36	0.036	0.000	0.000	0.000
1964	00.37	0.037	0.000	0.000	0.000
1964	00.38	0.038	0.000	0.000	0.000
1964	00.39	0.039	0.000	0.000	0.000
1964	00.40	0.040	0.000	0.000	0.000
1964	00.41	0.041	0.000	0.000	0.000
1964	00.42	0.042	0.000	0.000	0.000
1964	00.43	0.043	0.000	0.000	0.000
1964	00.44	0.044	0.000	0.000	0.000
1964	00.45	0.045	0.000	0.000	0.000
1964	00.46	0.046	0.000	0.000	0.000
1964	00.47	0.047	0.000	0.000	0.000
1964	00.48	0.048	0.000	0.000	0.000
1964	00.49	0.049	0.000	0.000	0.000
1964	00.50	0.050	0.000	0.000	0.000
1964	00.51	0.051	0.000	0.000	0.000
1964	00.52	0.052	0.000	0.000	0.000
1964	00.53	0.053	0.000	0.000	0.000
1964	00.54	0.054	0.000	0.000	0.000
1964	00.55	0.055	0.000	0.000	0.000
1964	00.56	0.056	0.000	0.000	0.000
1964	00.57	0.057	0.000	0.000	0.000
1964	00.58	0.058	0.000	0.000	0.000
1964	00.59	0.059	0.000	0.000	0.000
1964	00.60	0.060	0.000	0.000	0.000
1964	00.61	0.061	0.000	0.000	0.000
1964	00.62	0.062	0.000	0.000	0.000

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APPENDIX C

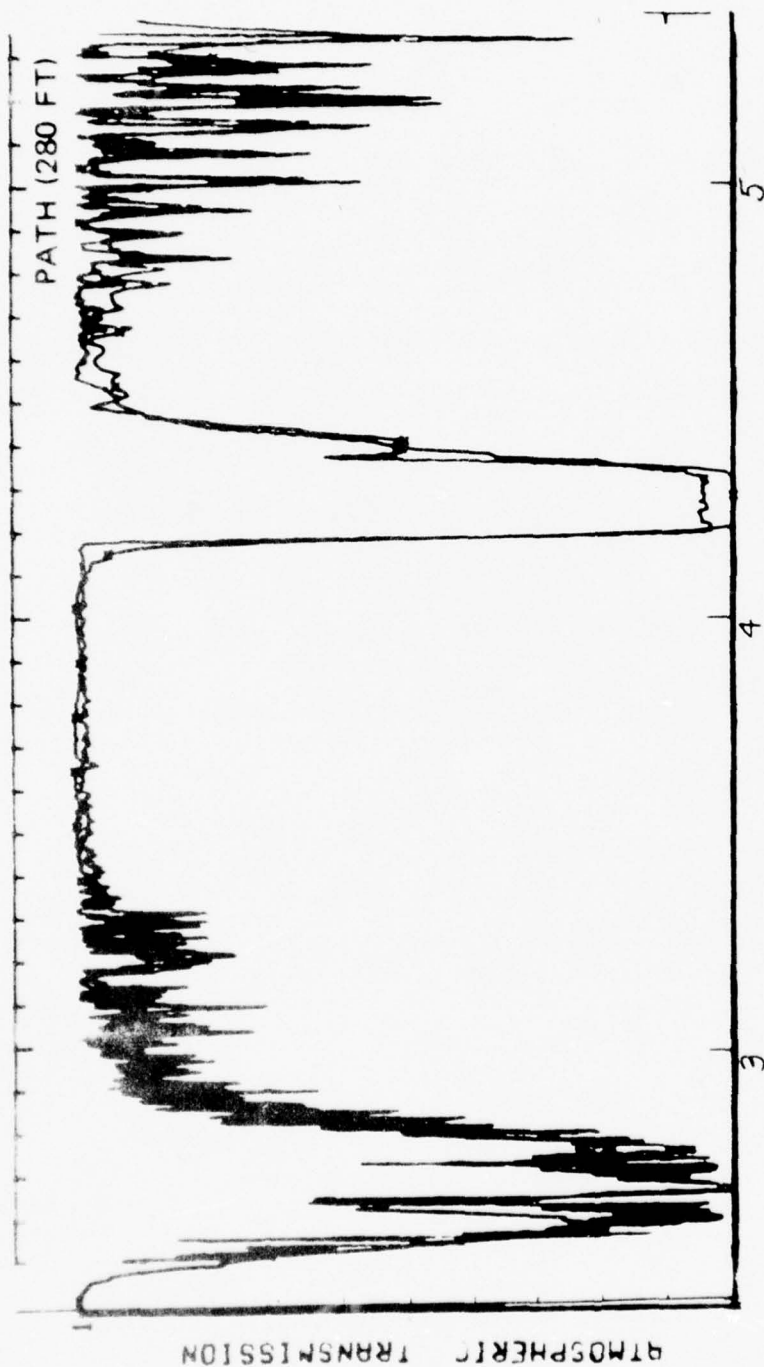
ATMOSPHERIC VALIDATION (GENERAL DYNAMICS)

In this section the results of a validation study described in Section 2-6 are presented. The original transmission curves were obtained by General Dynamics and described in a report for the U.S. Army Aviation System Command (AMCPM-IRCM), St. Louis, Missouri, titled "Infrared Signature Evaluation of a UH-1H Helicopter With and Without Radiation Suppression (June 1972).

The "Hide" transmission model was plotted over these curves with a small "*" every .3 inches for a direct comparison.

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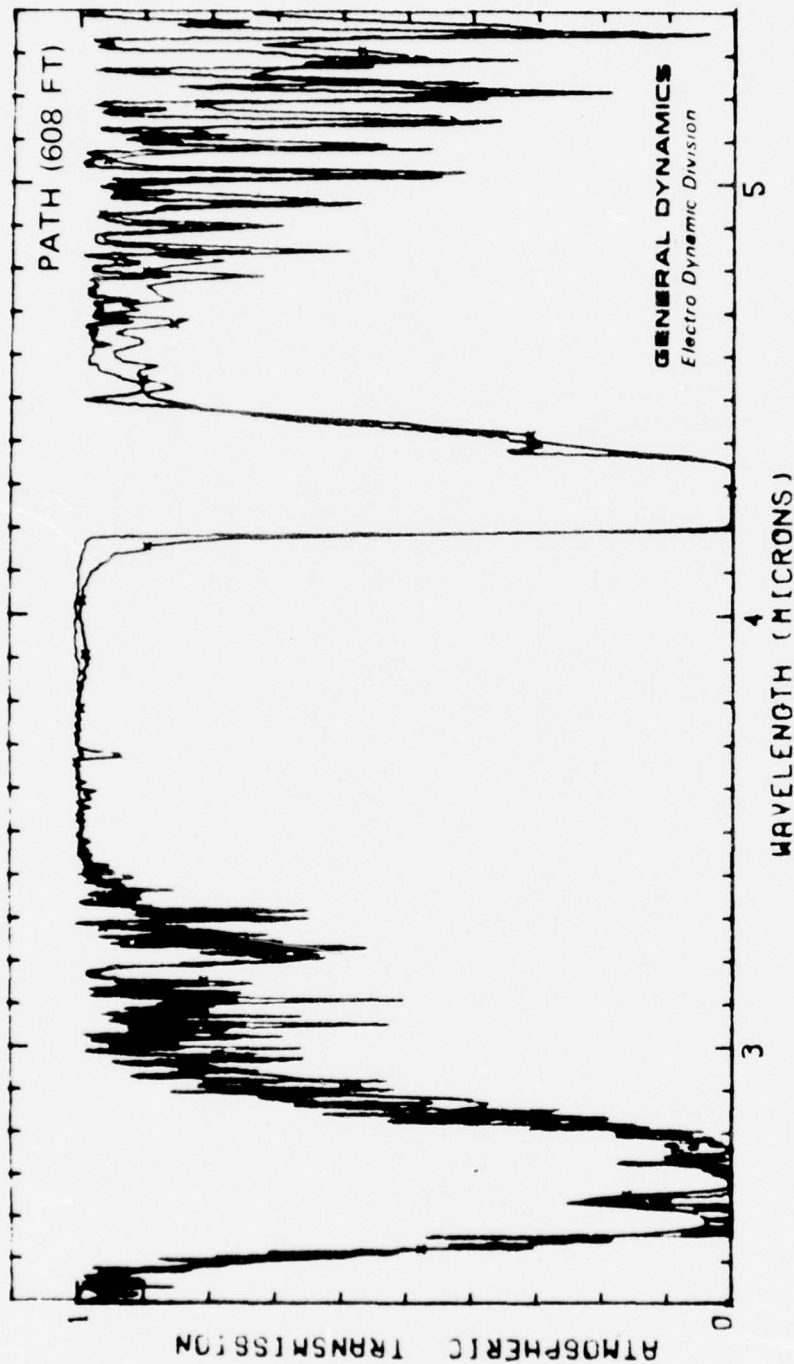


AIR TEMPERATURE: 42°F
RELATIVE HUMIDITY: 27%
PRECIPITABLE H₂O: .19 pr cm/km
ATMOSPHERIC PATH: 280 FT
ALTITUDE: 2281 FT

C-2

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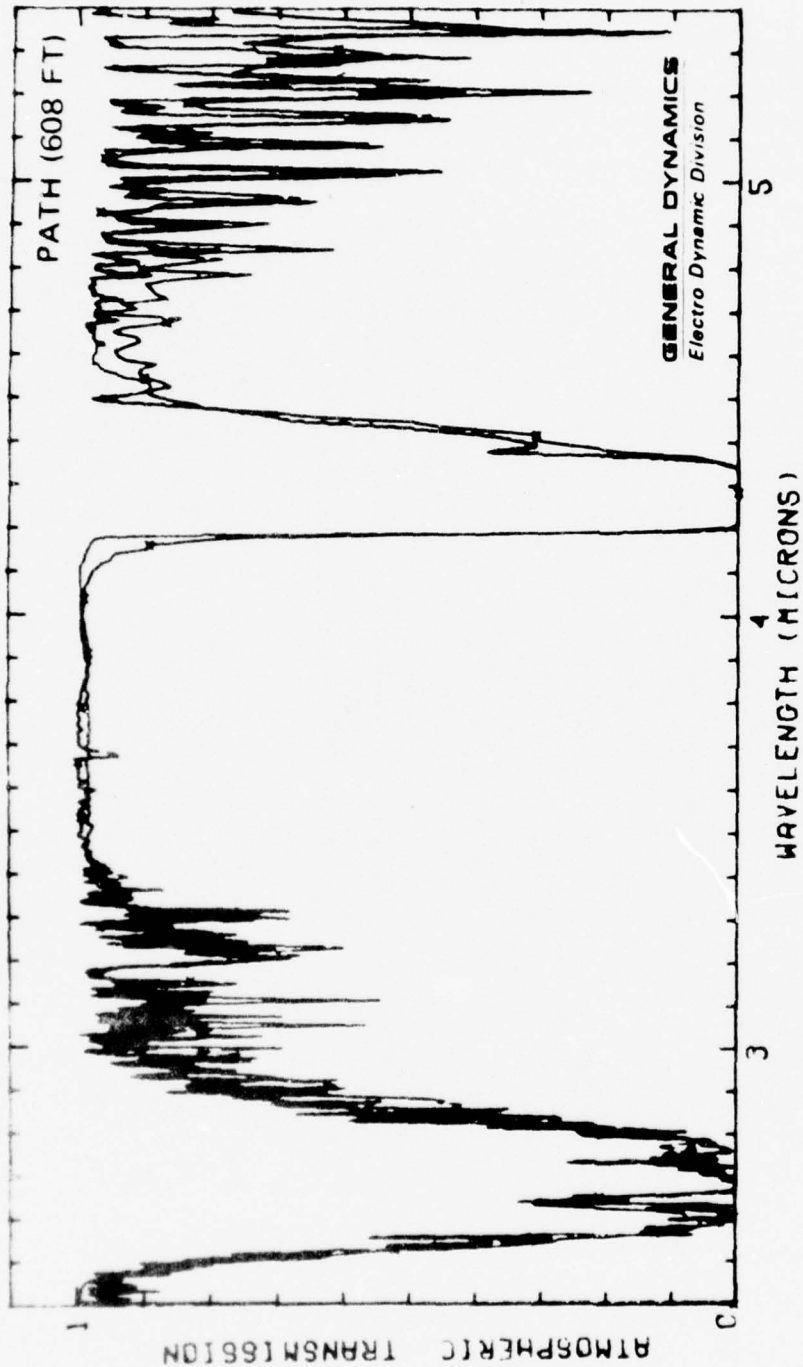


AIR TEMPERATURE: 53.5°F
RELATIVE HUMIDITY: 29%
PRECIPITABLE H₂O: .31 pr cm/km
ATMOSPHERIC PATH: 608 FT
ALTITUDE: 2281 FT

C-3

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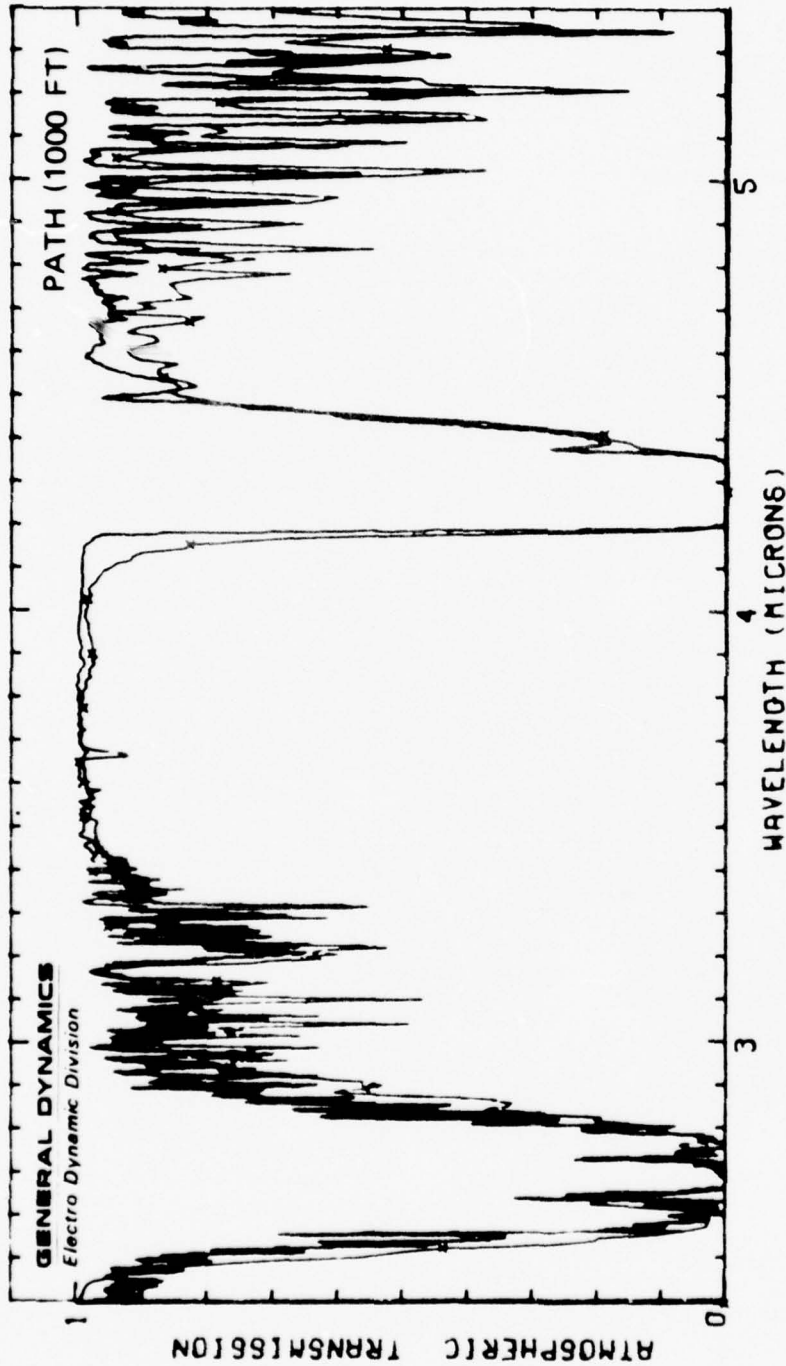


AIR TEMPERATURE: 39.5°F
RELATIVE HUMIDITY: 39%
PRECIPITABLE H₂O: .25 pr cm/km
ATMOSPHERIC PATH: 608 FT
ALTITUDE: 2281 FT

C-4

UNCLASSIFIED

UNCLASSIFIED

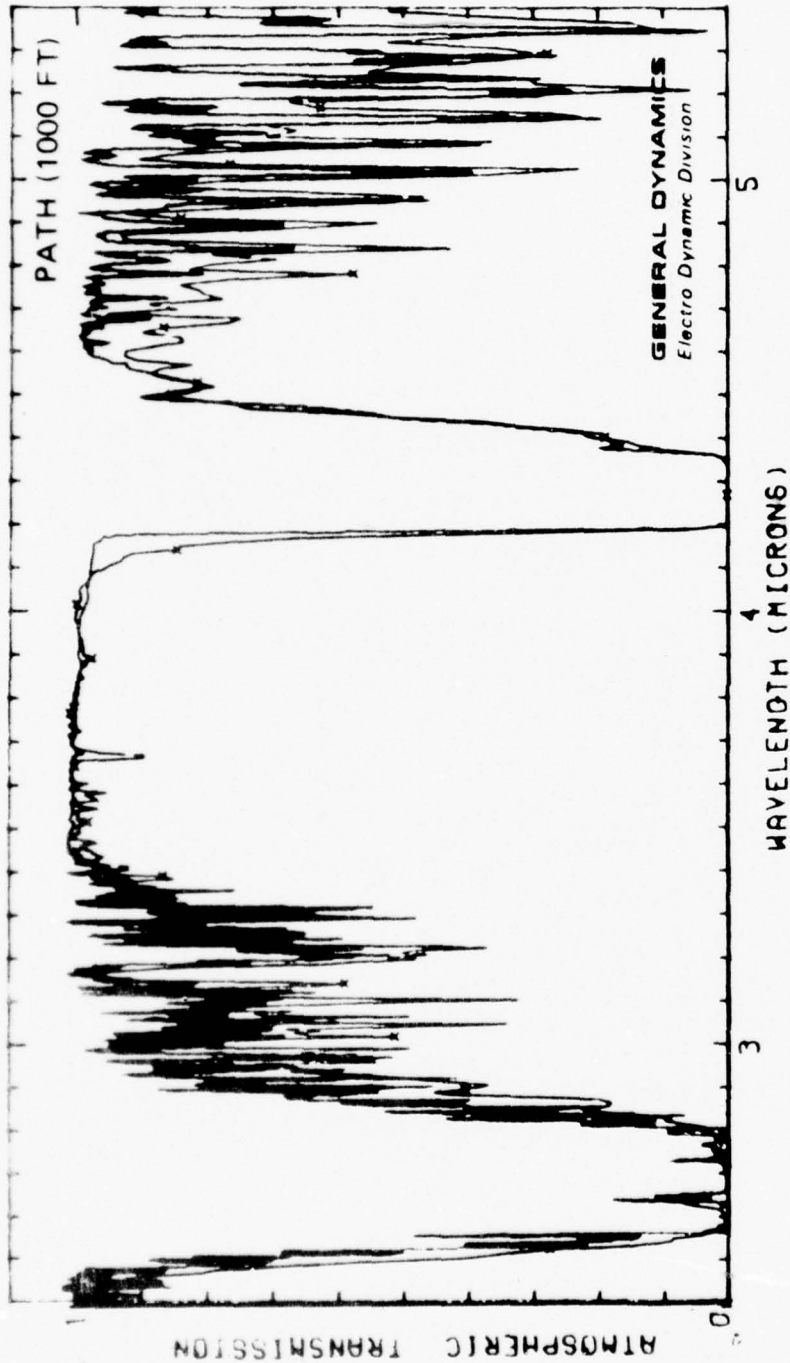


AIR TEMPERATURE: 20°F
RELATIVE HUMIDITY: 74%
PRECIPITABLE H₂O: .22 pr cm/km
ATMOSPHERIC PATH: 1000 FT
ALTITUDE: 2281 FT

C-5

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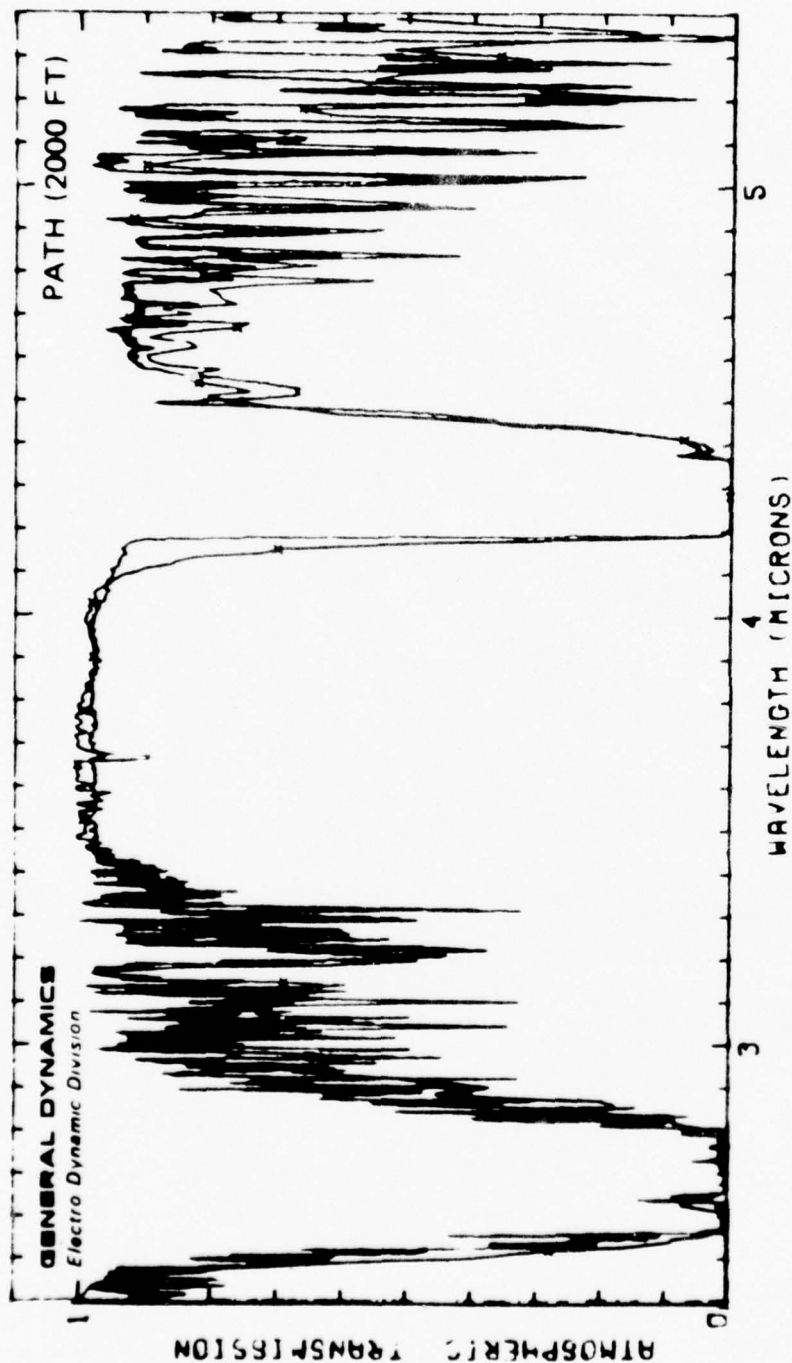


AIR TEMPERATURE: 63°F
RELATIVE HUMIDITY: 32%
PRECIPITABLE H₂O: 45 pr cm/km
ATMOSPHERIC PATH: 1,000 FT
ALTITUDE: 2281 FT

C-6

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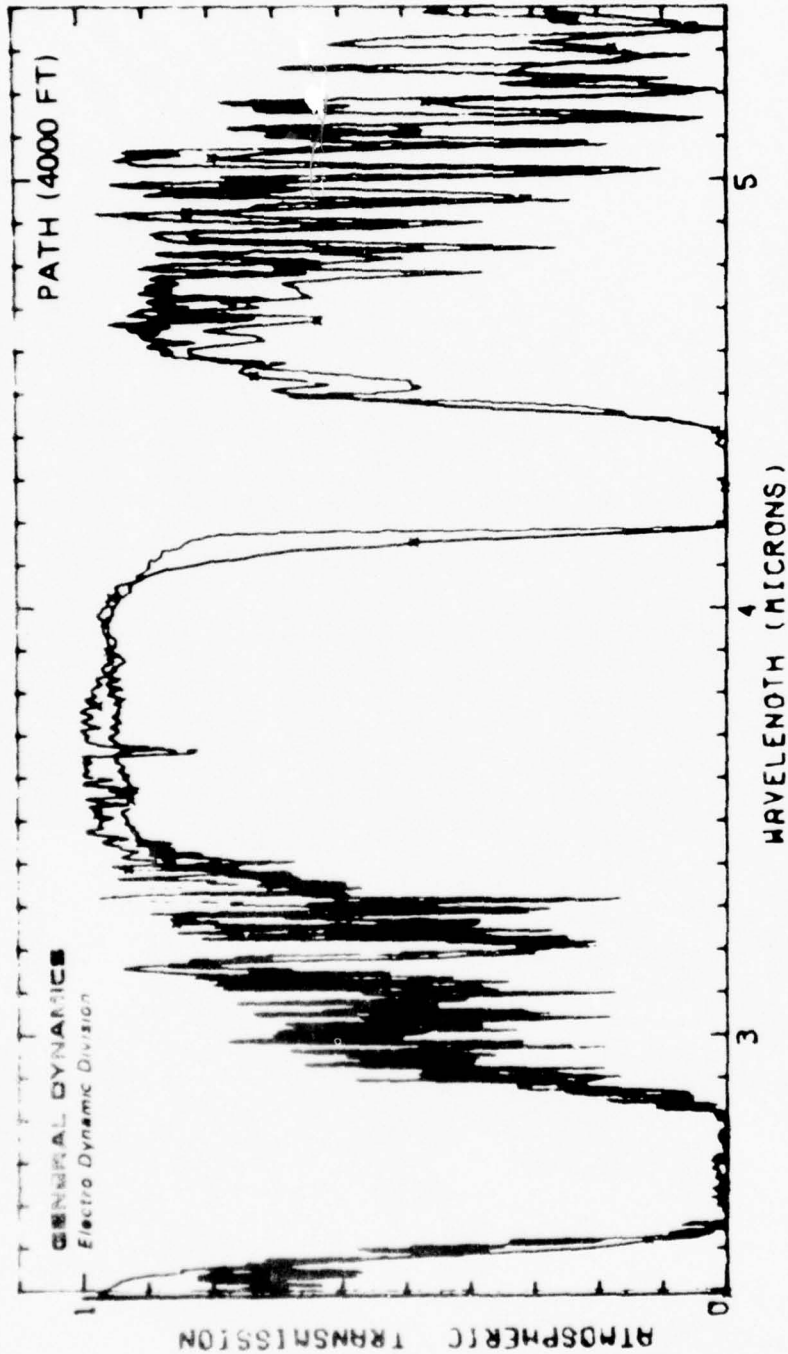


AIR TEMPERATURE: 33°F
RELATIVE HUMIDITY: 46%
PRECIPITABLE H₂O: .23 pr cm/km
ATMOSPHERIC PATH: 2000 FT
ALTITUDE: 2281 FT

C-7

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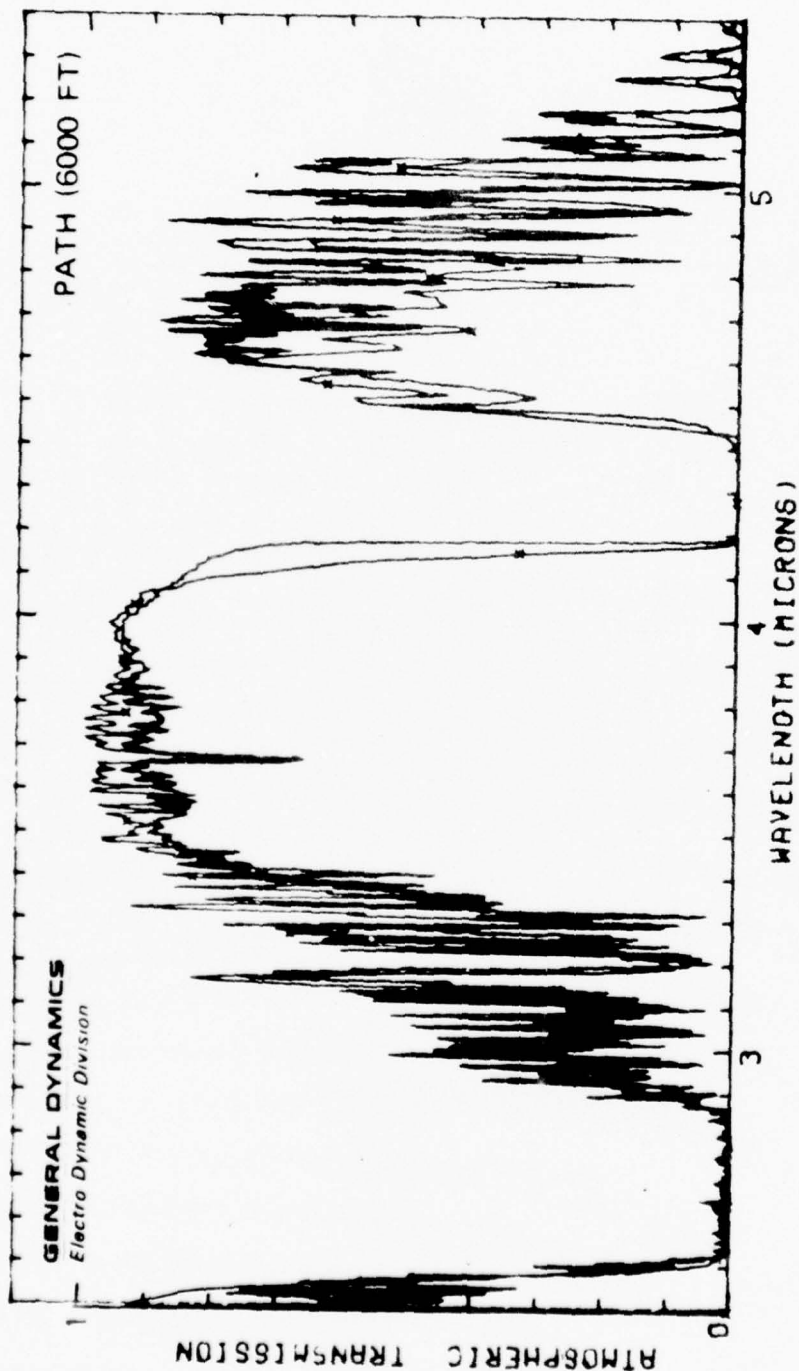


AIR TEMPERATURE: 44°F
RELATIVE HUMIDITY: 33%
PRECIPITABLE H₂O: .25 pr cm/km
ATMOSPHERIC PATH: 4000 FT
ALTITUDE: 2281 FT

C-8

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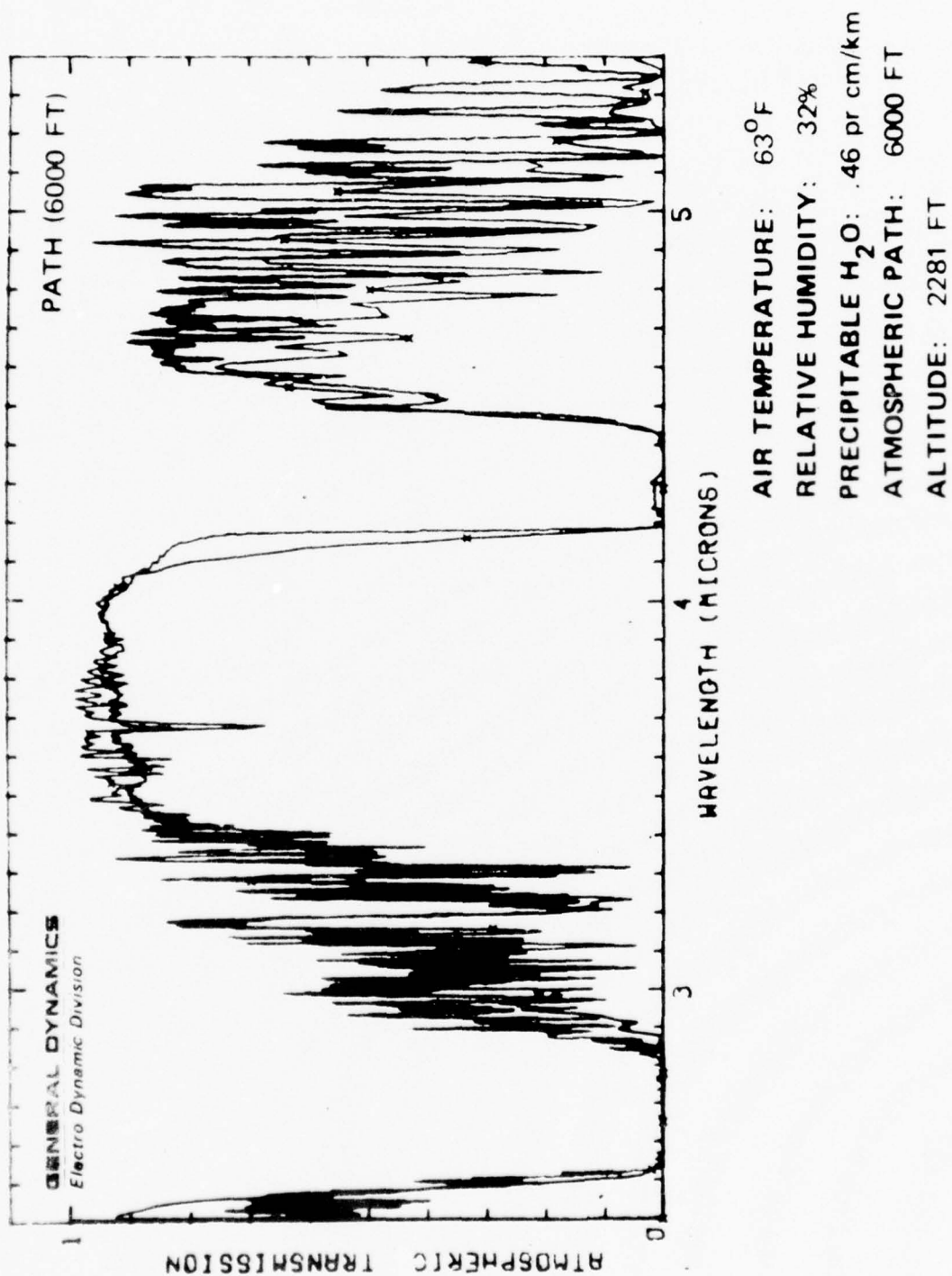


AIR TEMPERATURE: 45°F
RELATIVE HUMIDITY: 64%
PRECIPITABLE H₂O: .51 pr cm/km
ATMOSPHERIC PATH: 6000 FT
ALTITUDE: 2281 FT

C-9

UNCLASSIFIED

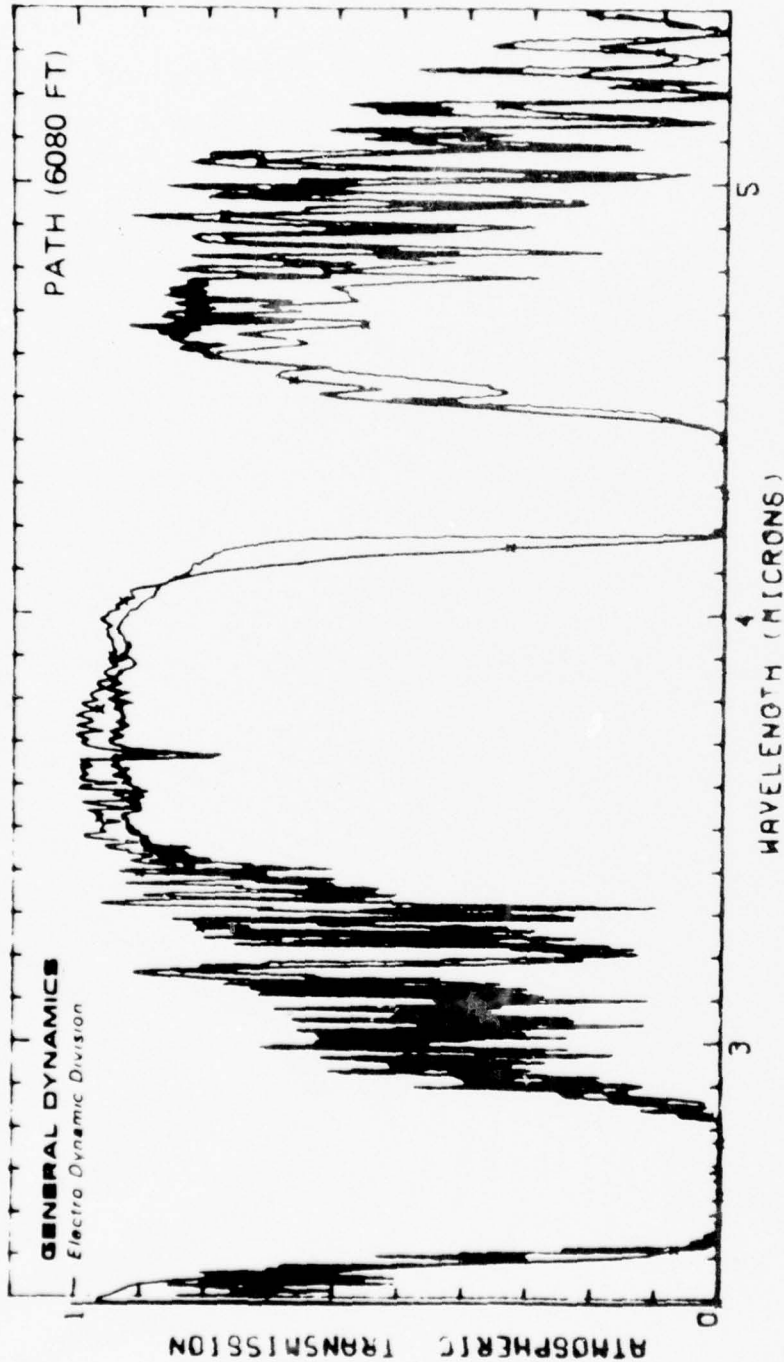
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C-10

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AIR TEMPERATURE: 41°F
RELATIVE HUMIDITY: 35%
PRECIPITABLE H₂O: .24 pr cm/km
ATMOSPHERIC PATH: 6080 FT
ALTITUDE: 2281 FT

C-11

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APPENDIX D

YATES AND TAYLOR VALIDATION DATA

The data obtained experimentally by Yates and Taylor working for the Naval Research Laboratory in Washington is presented in this section overlaid with the Hide model prediction for validation purposes. The data was taken under seven different weather conditions and ranges from $.5\mu$ to 13μ . It is plotted in the following figures as a light smooth line. The Hide predictions are plotted as heavy dark lines with "x's" every $.3$ inches. With the exception of Plate #11, two graphs are presented on each page; one is plotted with the optimum scattering function discussed in Section 2.5 and one with the general scattering function also described in Section 2.5. This general function has the form:

$$T_s = \text{EXP} (-C \lambda^{-1})$$

whereas the optimum takes the form

$$T_s = \text{EXP} (-A \lambda^{-B})$$

A,B,C are given under the measurement conditions for each plate.

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Yates and Taylor Measurements Plate #5

Range (KM)	5.5	16.25
Alt (K ft)	S.L.	S.L.
Temp ($^{\circ}$ F)	38	53.
RH (%)	66	41.
H ₂ O (CM)	2.2	6.78
CO ₂ (CM)	176.	520.
N ₂ O (CM)	1.54	4.55
O ₃ (CM)	.169	.498
General Scattering	.503	.681
Optimum Scattering A	.1026	.0402
B	.9020	.9982

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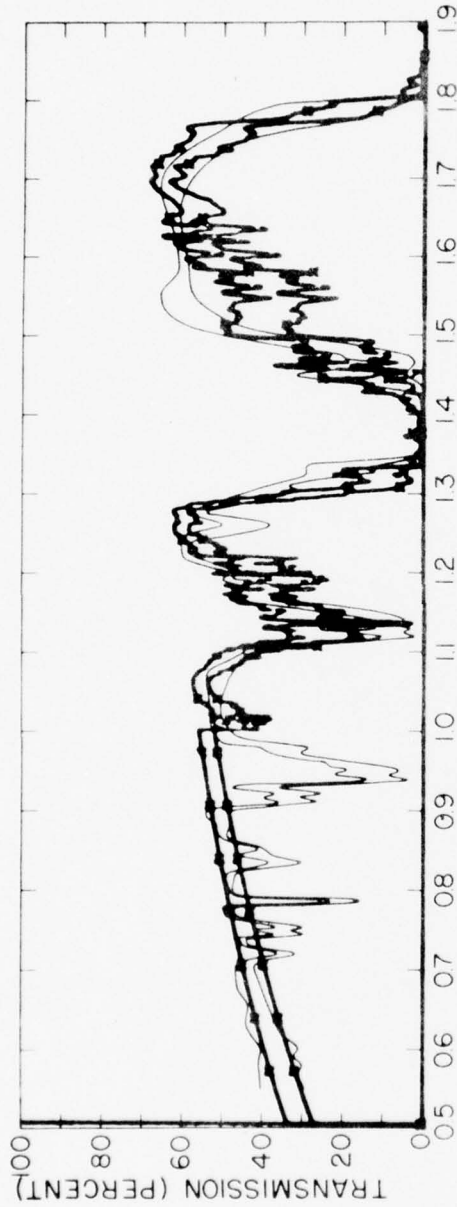


Plate 5 Optimum Scattering

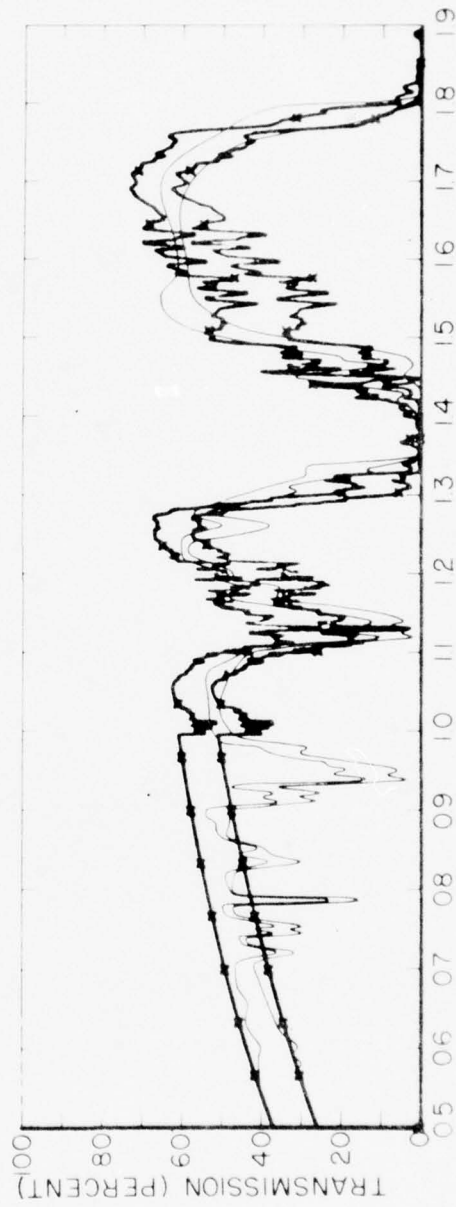


Plate 5 General Scattering

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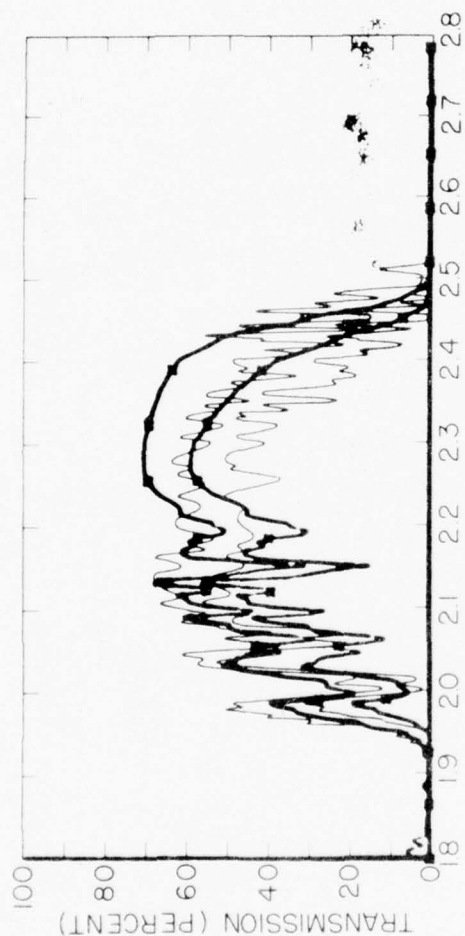


Plate 5-1 Optimum Scattering

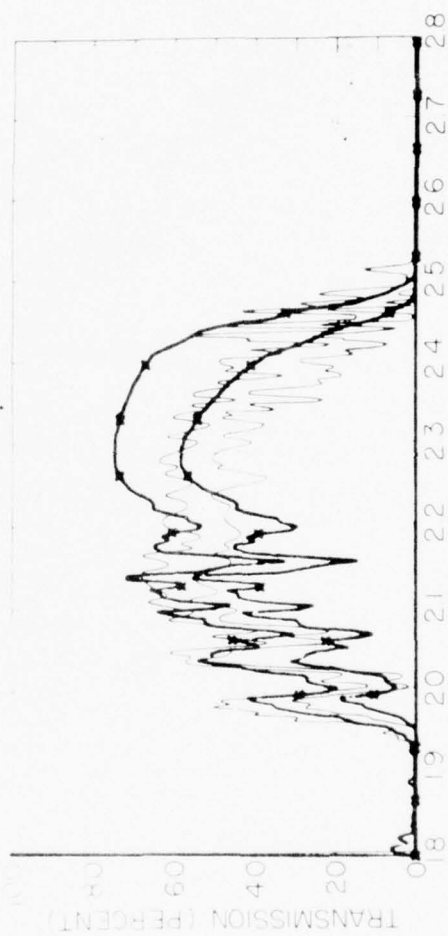


Plate 5-1 General Scattering

11-1

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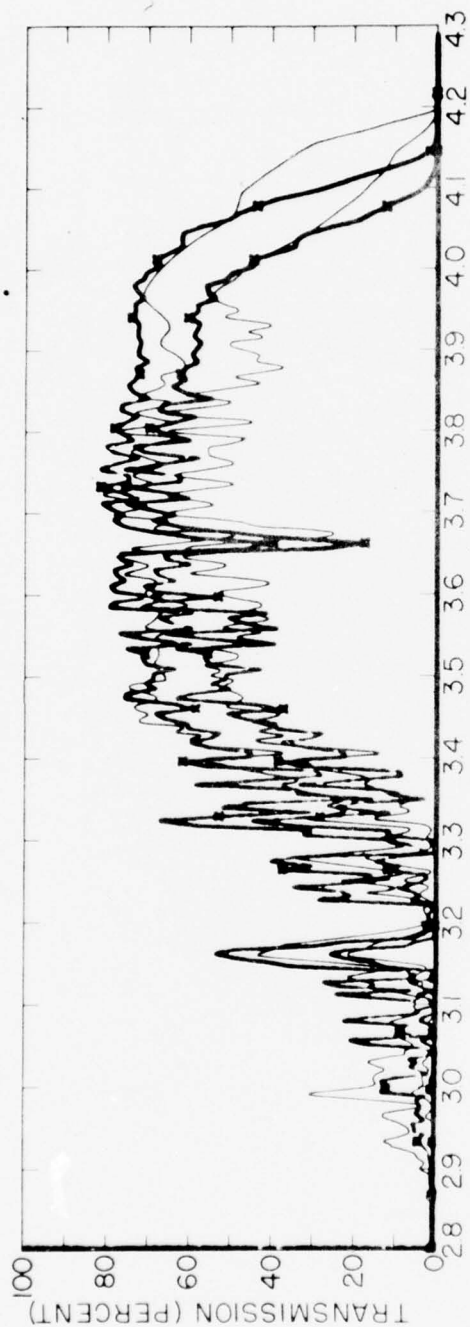


Plate 5-2 Optimum Scattering

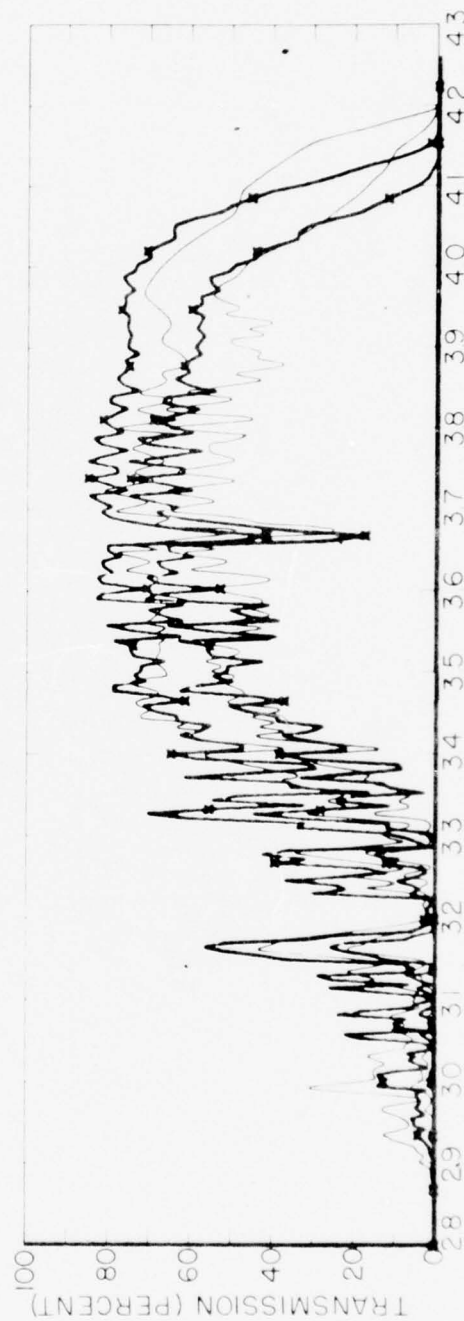
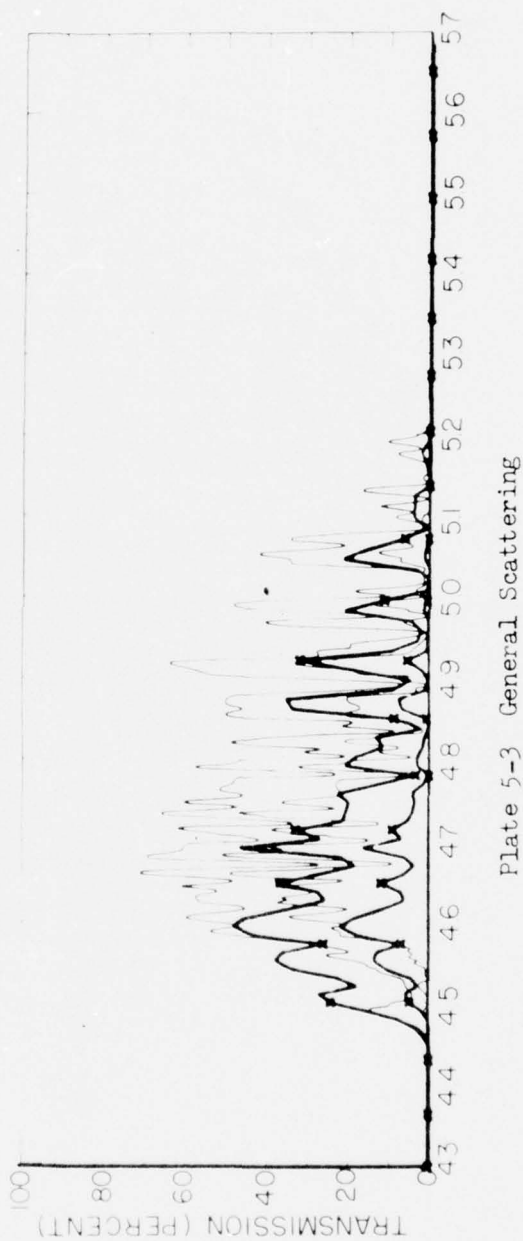
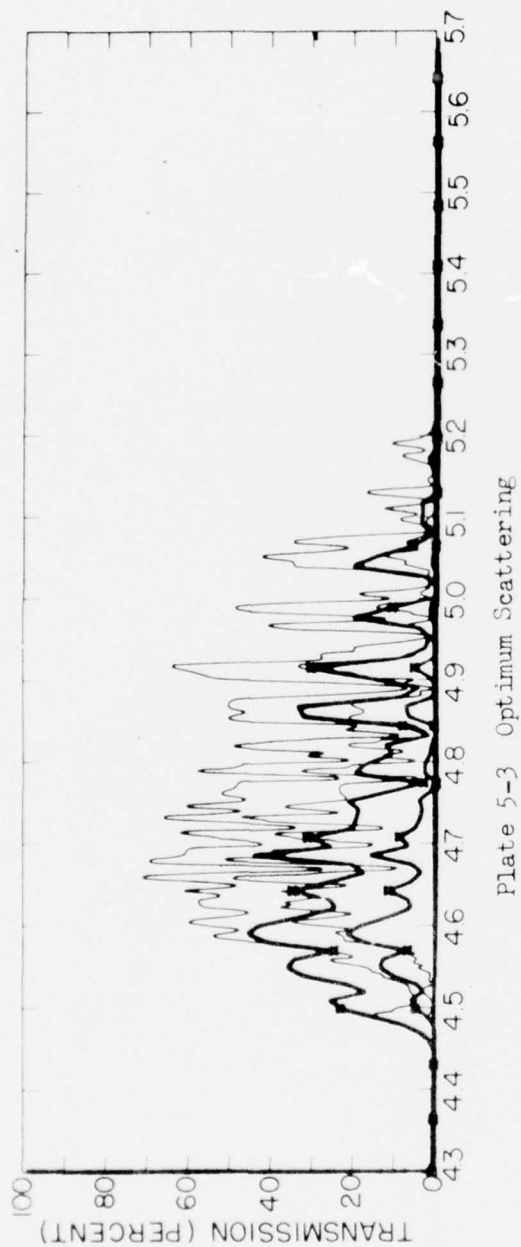


Plate 5-2 General Scattering

0-5

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D-6

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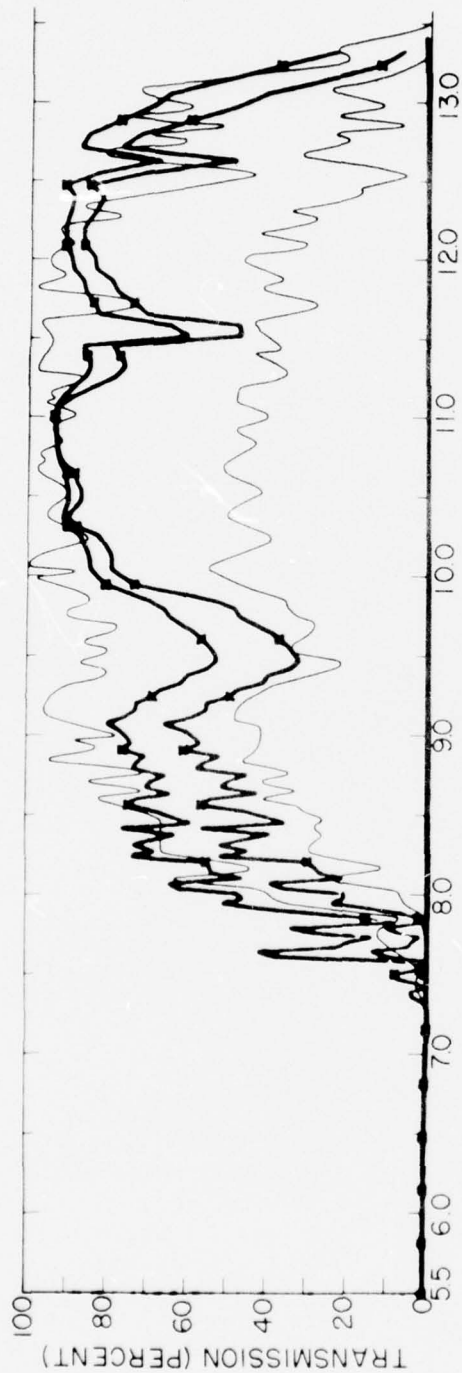


Plate 5-4 Optimum Scattering

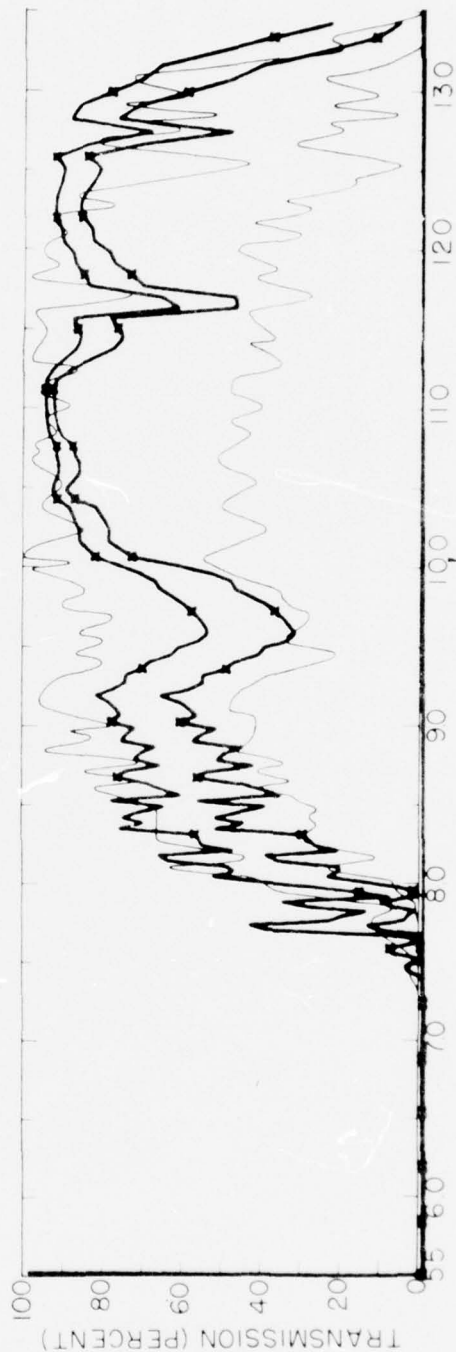


Plate 5-4 General Scattering

D-7

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Yates & Taylor Measurements Plate #6

Range (KM)	5.5	16.25
Alt (K ft)	S.L.	S.L.
Temp ($^{\circ}$ F)	64.	68.
Relative Humidity	51	43
H ₂ O (Cm)	4.18	15.1
CO ₂ (Cm)	176.	520.
N ₂ O (Cm)	1.54	4.55
O ₃ (Cm)	.169	.498
General Scattering	.196	.464
Optimum Scatt A	.0476	.0298
B	.8390	1.078

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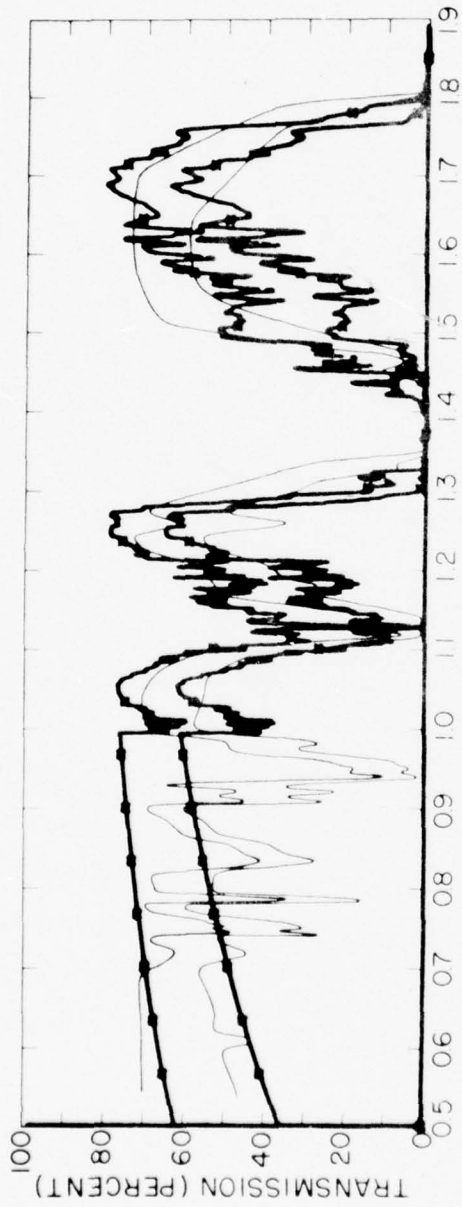


Plate 6 Optimum Scattering

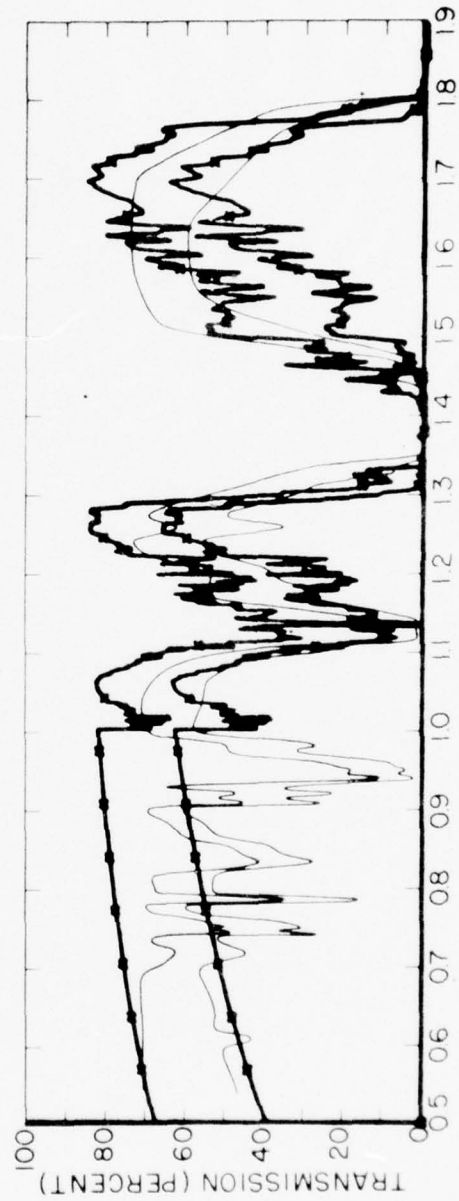


Plate 6 General Scattering

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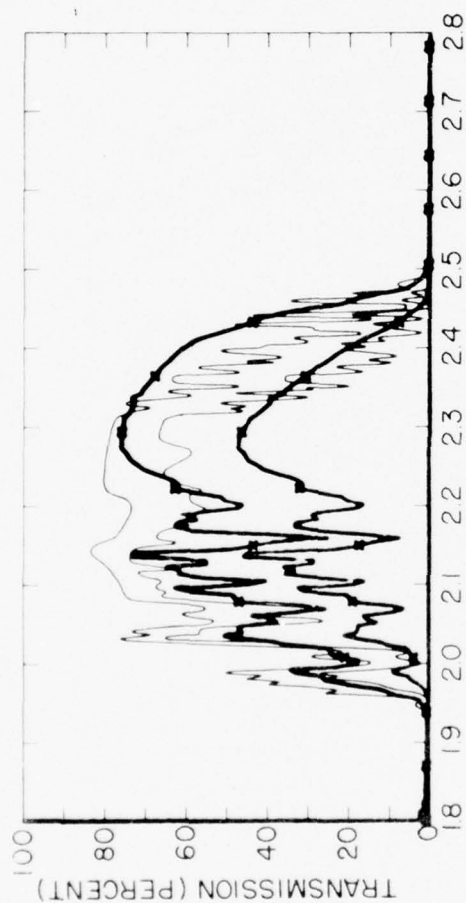


Plate 6-1 Optimum Scattering

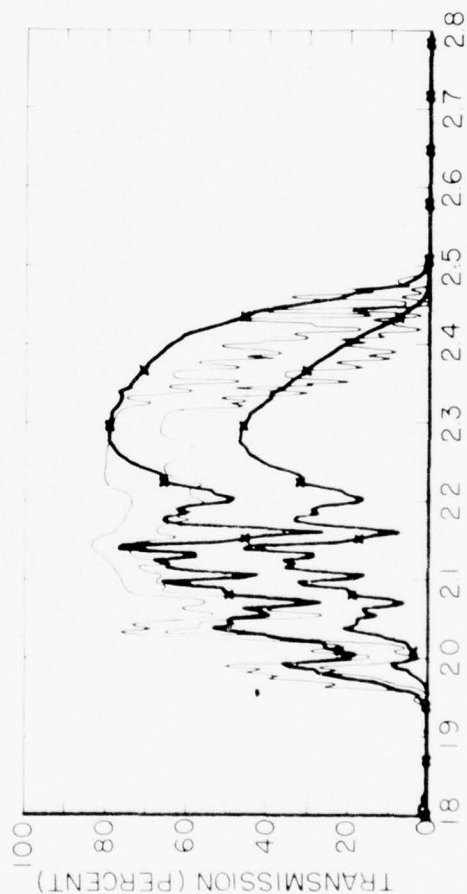


Plate 6-1 General Scattering

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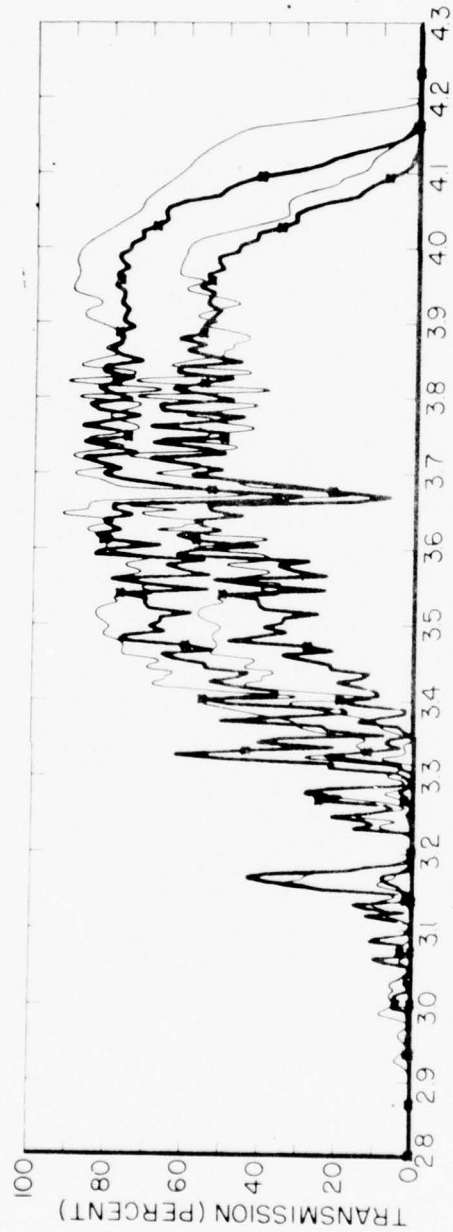


Plate 6-2 Optimum Scattering

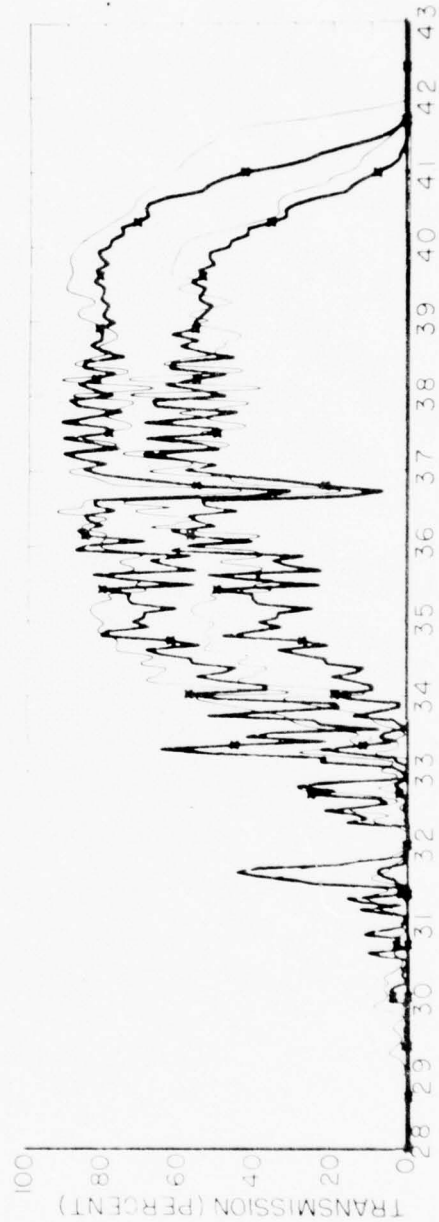


Plate 6-2 General Scattering

D-11

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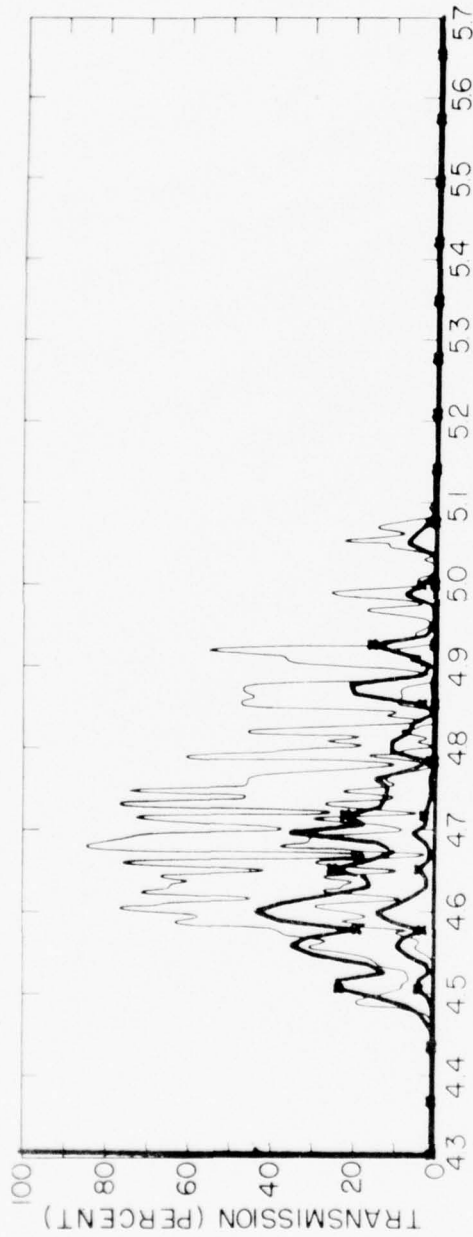


Plate 6-3 Optimum Scattering

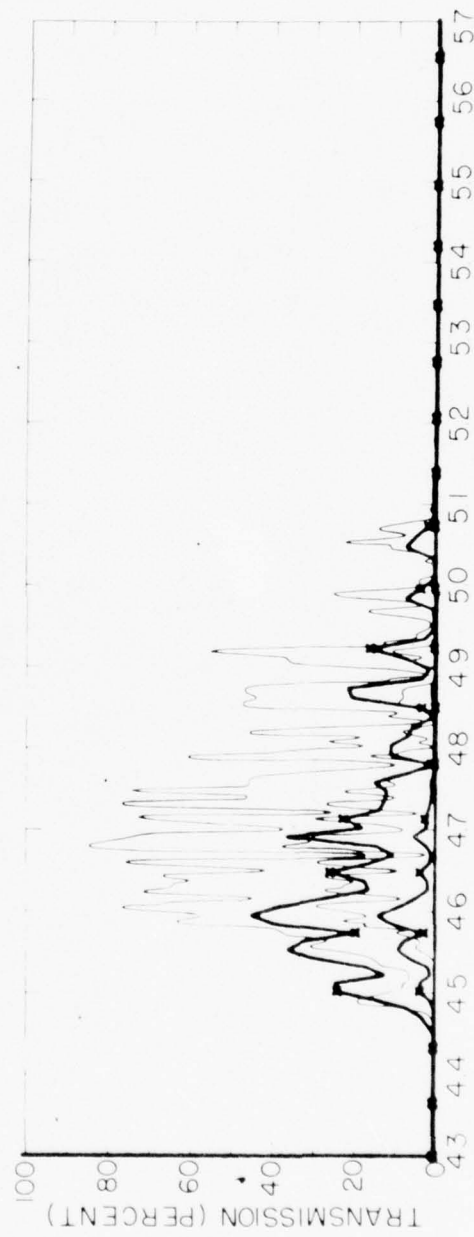


Plate 6-3 General Scattering

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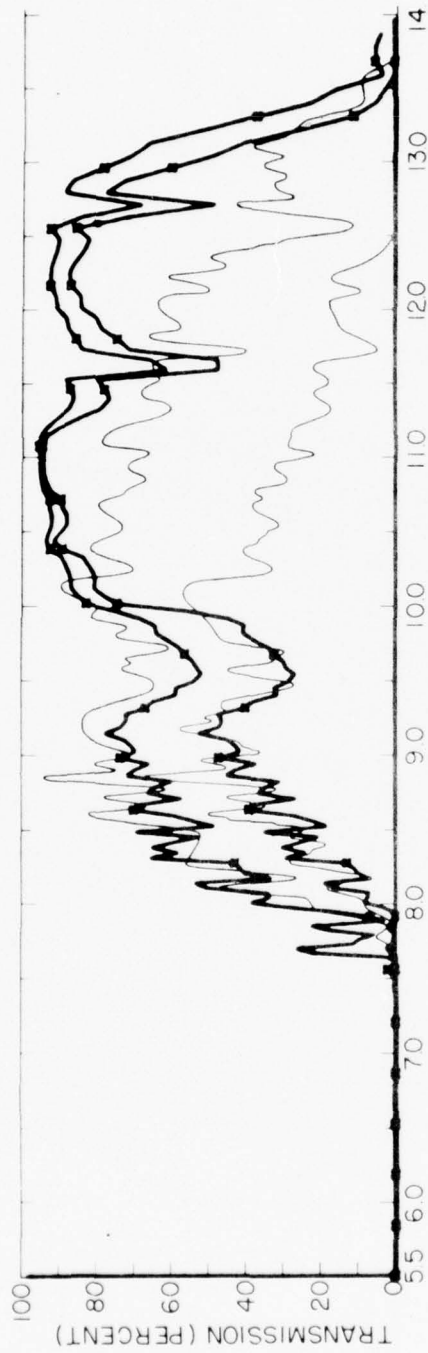


Plate 6-4 Optimum Scattering

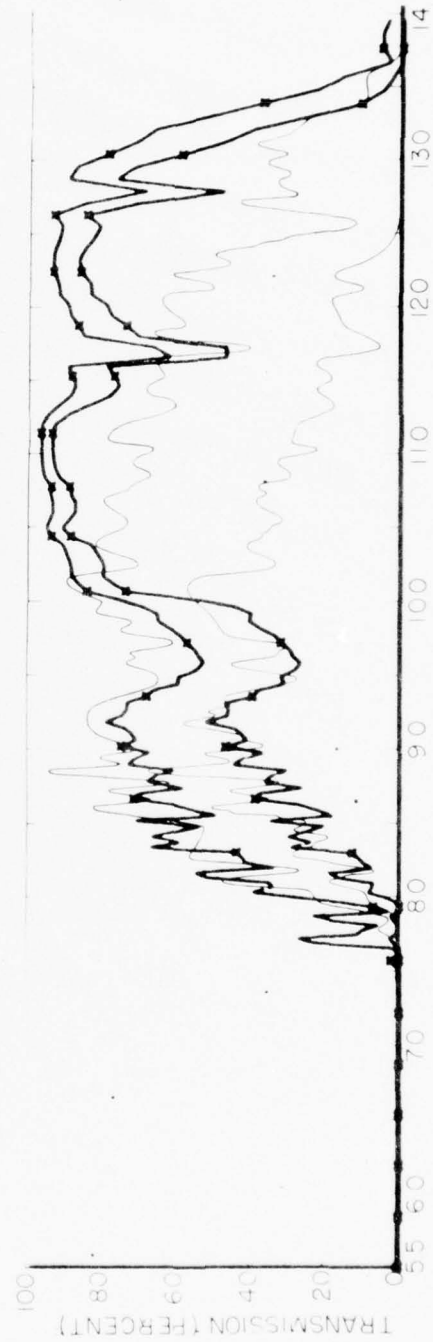


Plate 6-4 General Scattering

D-13

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Yates and Taylor Measurements Plate #7

Range (KM)	5.5	16.25
Altitude (K ft)	S.L.	S.L.
Temp ($^{\circ}$ F)	78	74
Relative Humidity	73	82
H ₂ O (CM)	9.4	27.7
CO ₂ (CM)	176	520
N ₂₀ (CM)	1.54	4.55
O ₃ (CM)	.169	.498
General Scattering	.662	1.27
Optimum Scattering A	.0881	.0600
B	1.558	1.436

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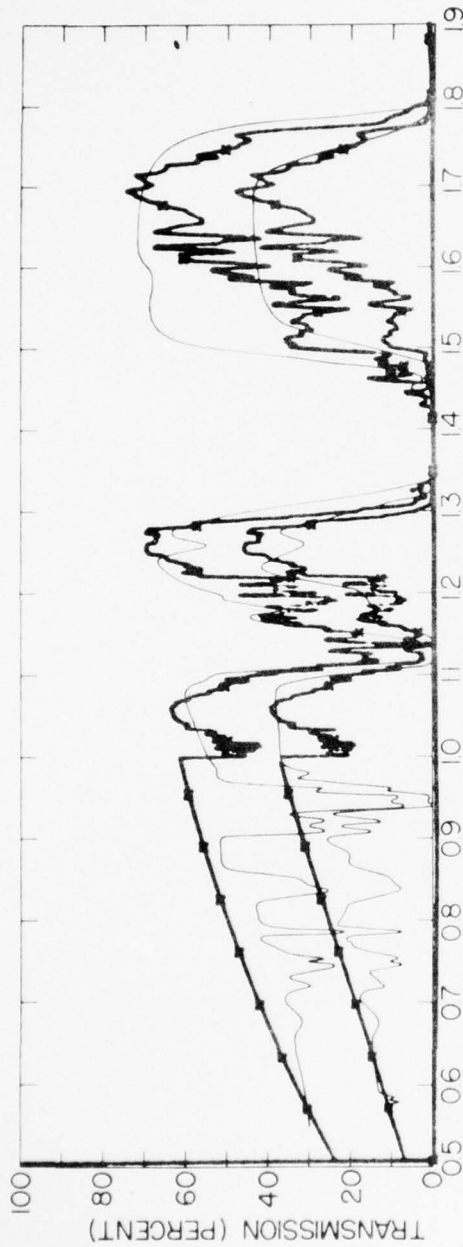


Plate 7 Optimum Scattering



Plate 7 General Scattering

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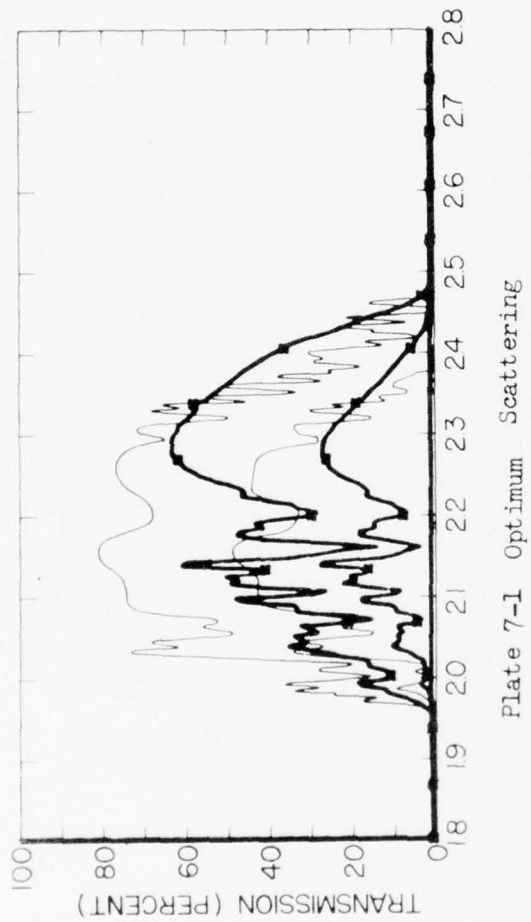


Plate 7-1 Optimum Scattering

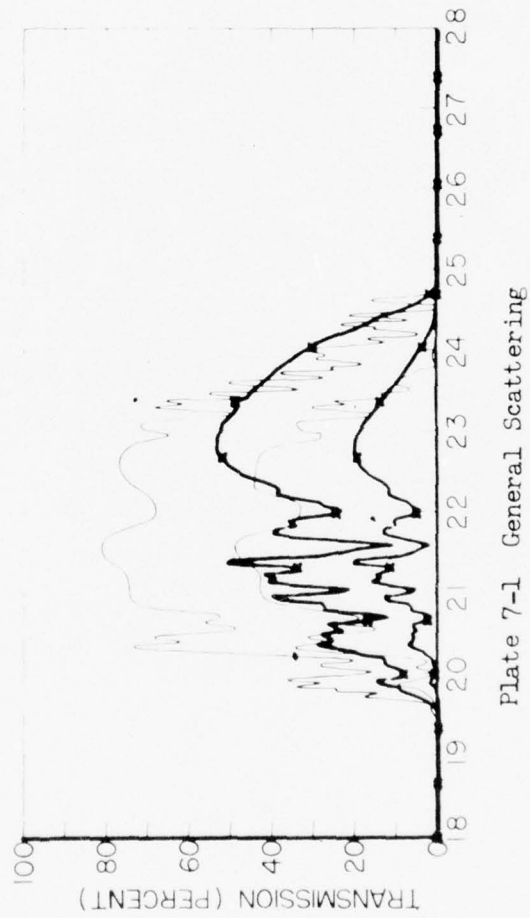
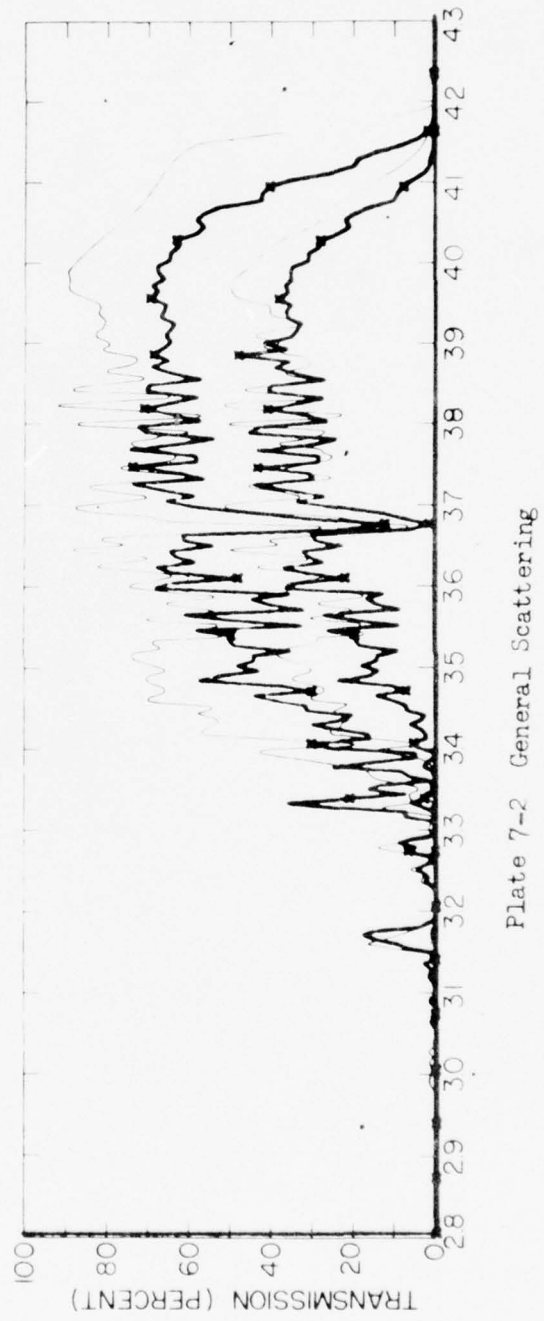
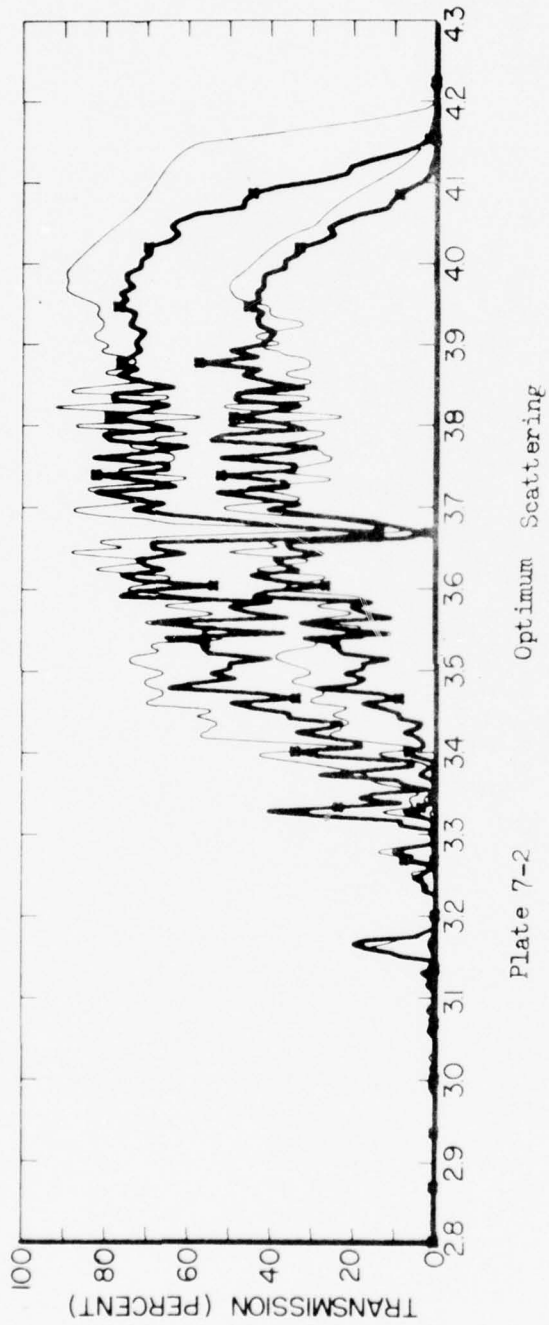


Plate 7-1 General Scattering

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D-17

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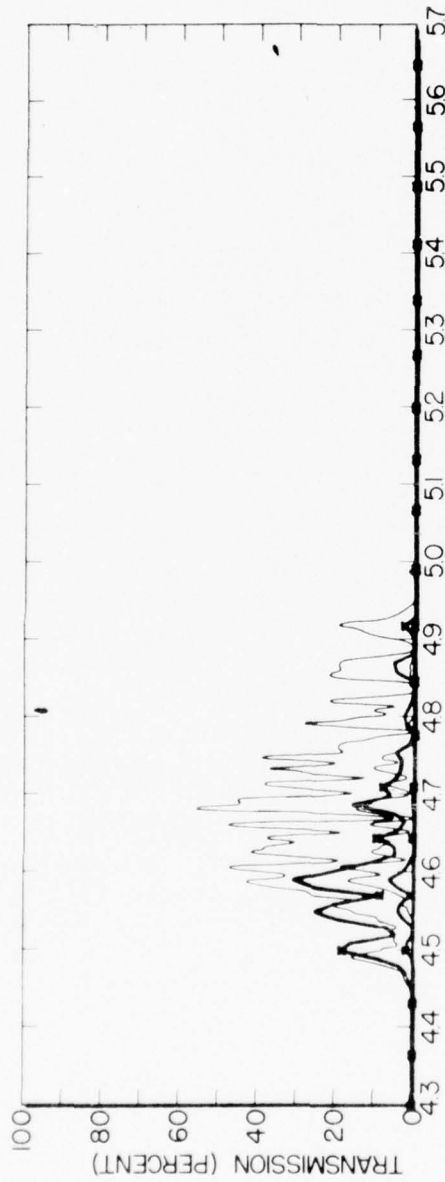


Plate 7-3 Optimum Scattering

D-18

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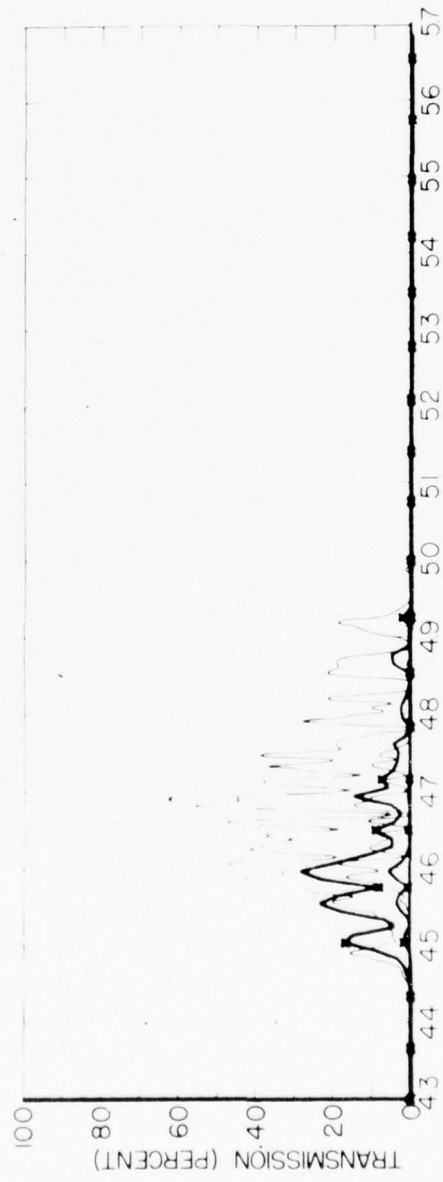


Plate 7-3 General Scattering

UNCLASSIFIED

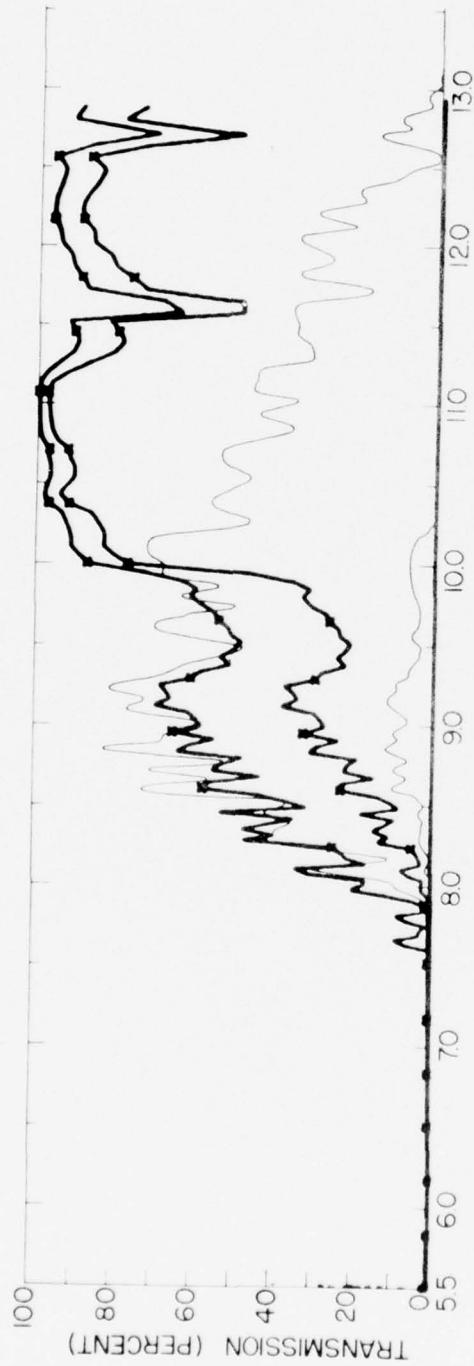


Plate 7-4 Optimum Scattering

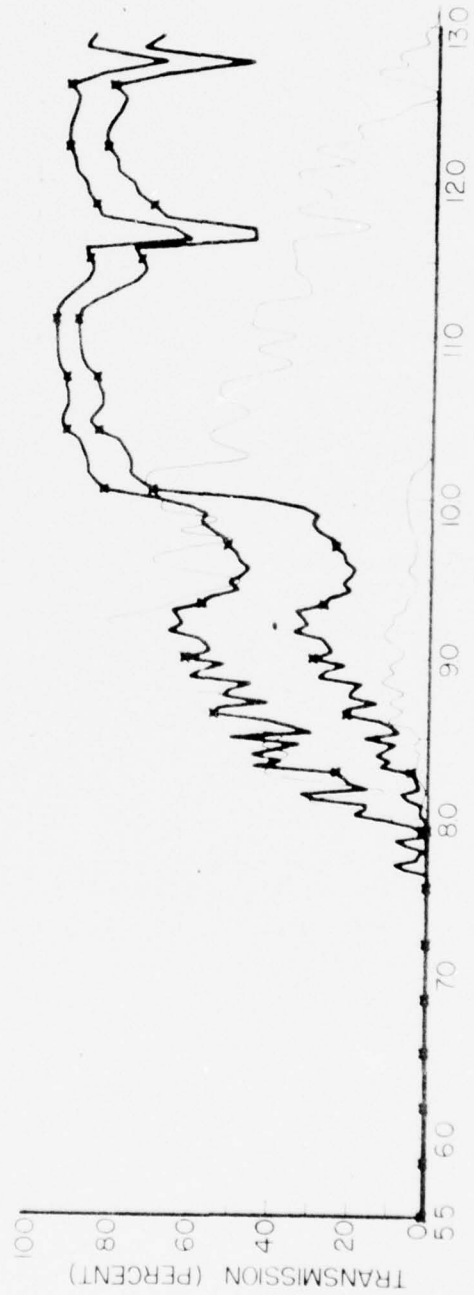


Plate 7-4 General Scattering

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Yates & Taylor Measurements Plate #8

Range (KM)	16.25
Altitude (K ft)	S.L.
Temp (^o F)	87.
Relative Humidity	59.
H2O (CM)	37.
CO2 (CM)	520
N2O (CM)	4.55
O3 (CM)	.498
General Scattering	2.15
Optimum Scattering A	.096
B	1.610

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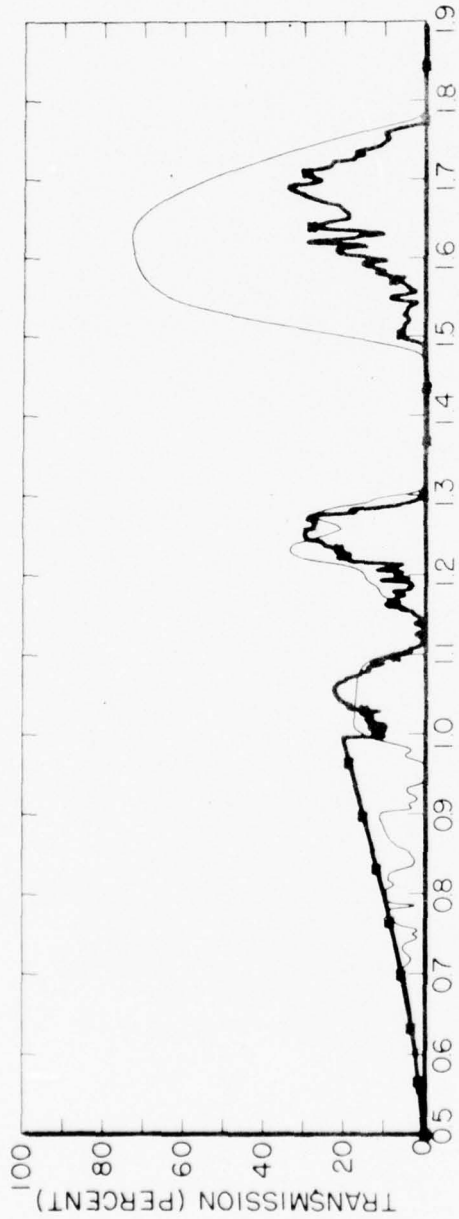


Plate 8 Optimum Scattering

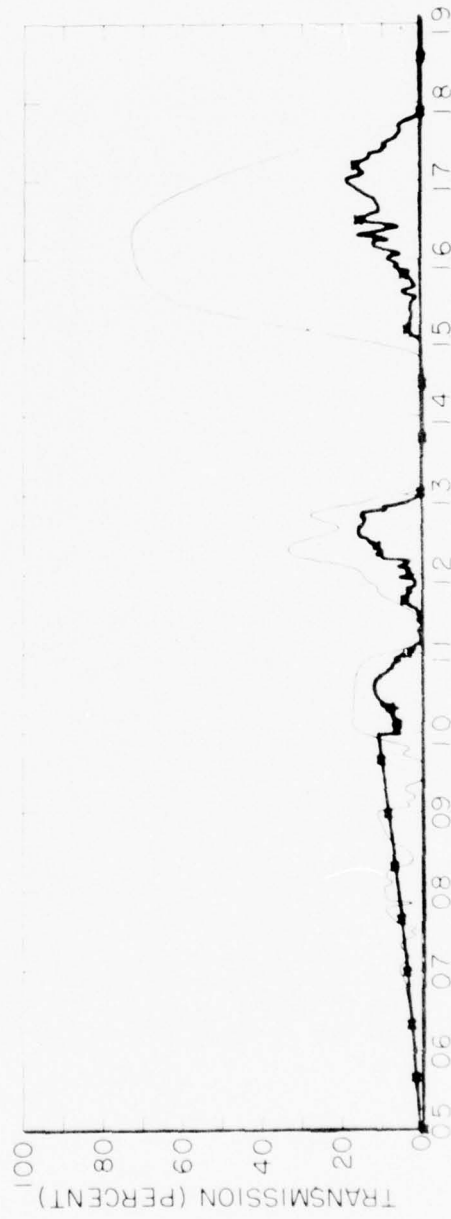


Plate 8 General Scattering

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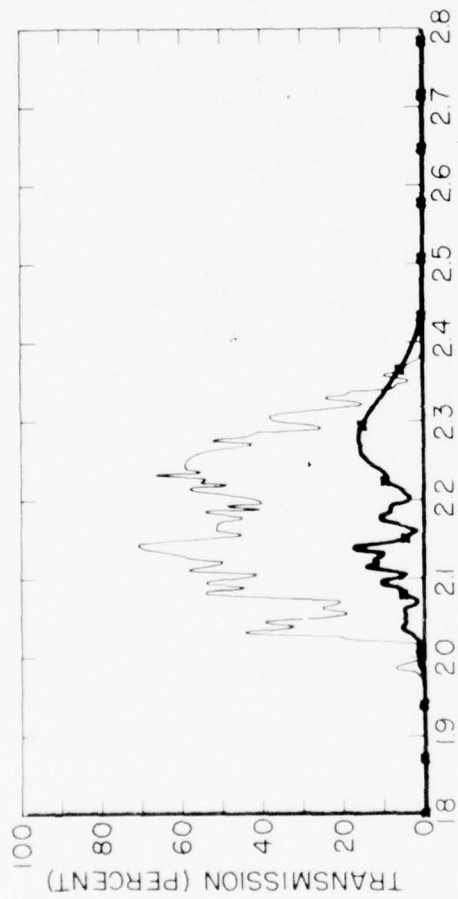


Plate 8-1 Optimum Scattering

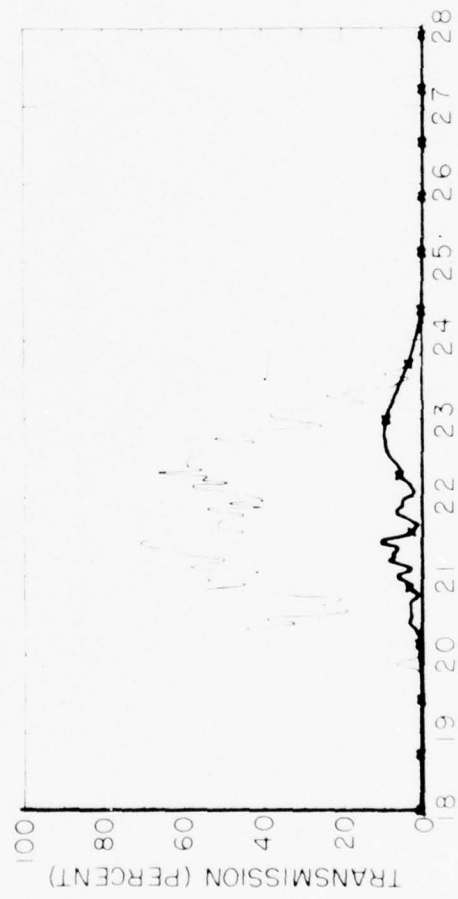


Plate 8-1 General Scattering

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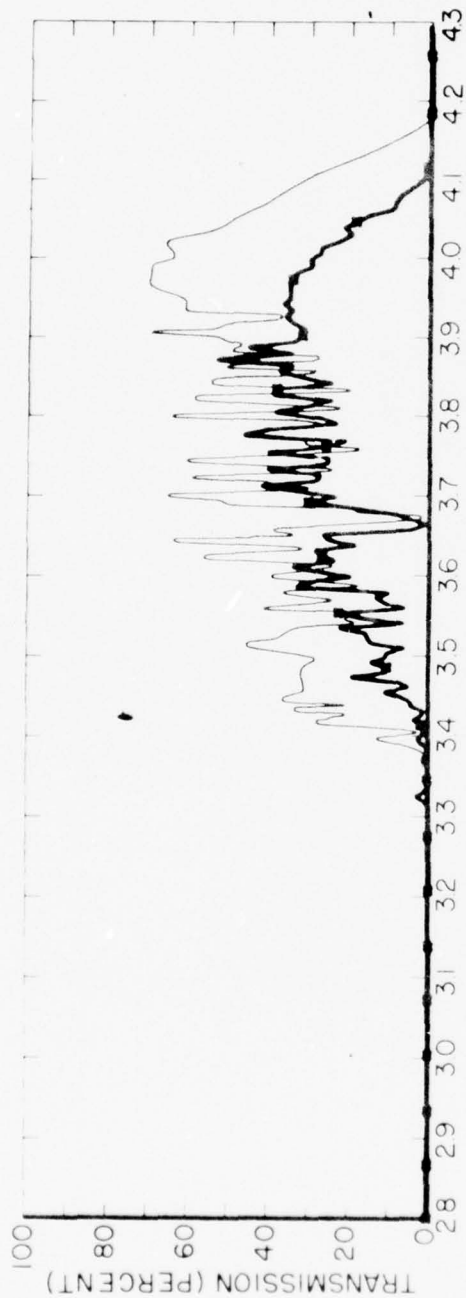


Plate 8-2 Optimum Scattering

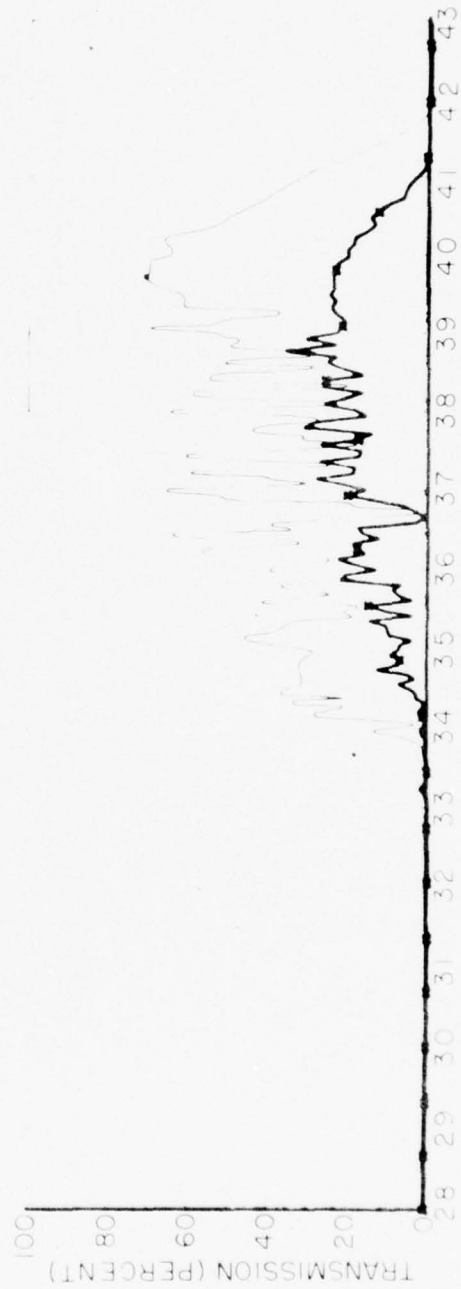


Plate 8-2 General Scattering

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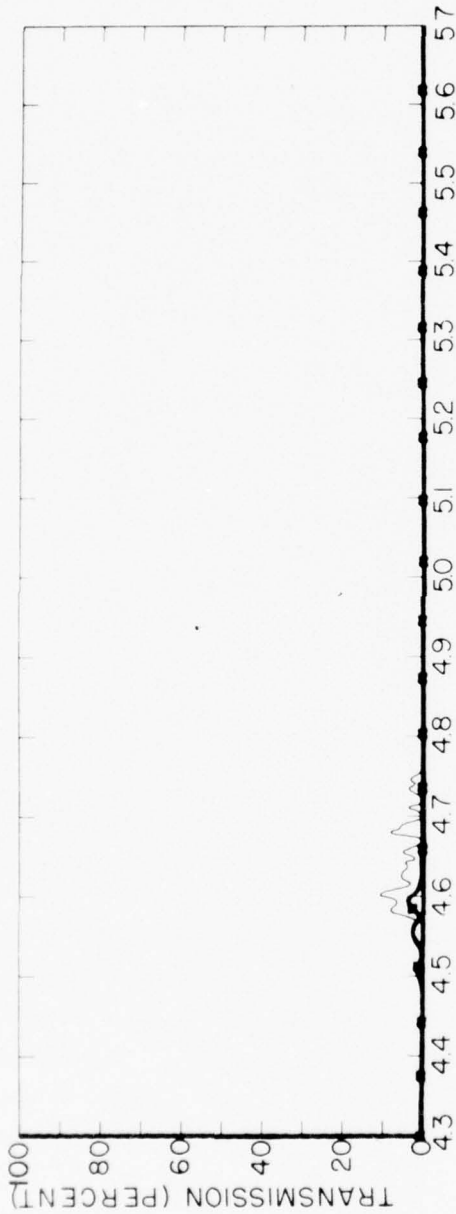


Plate 8-3 Optimum Scattering

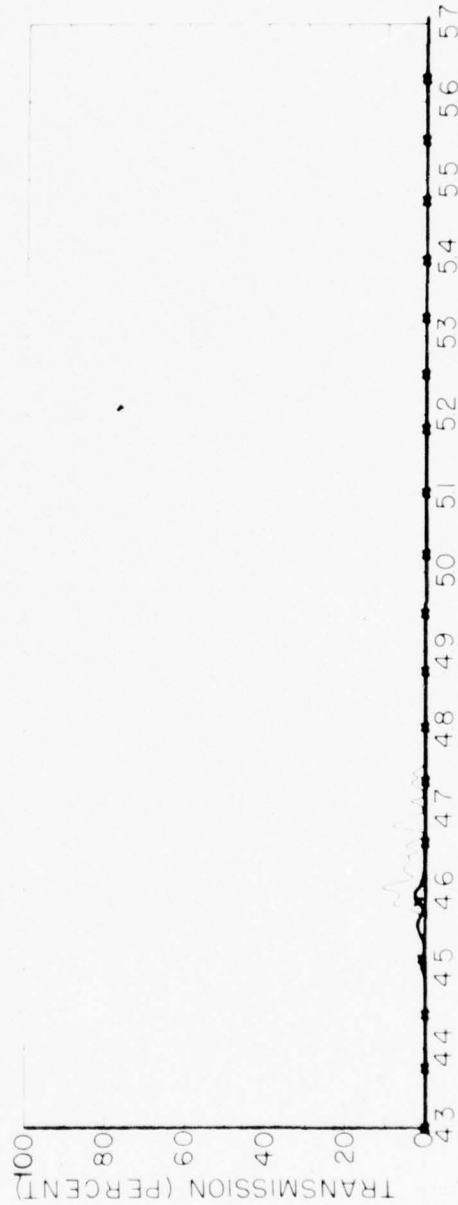


Plate 8-3 General Scattering

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Yates and Taylor Measurements Plate #9

Range (KM)		27.7
Altitude		10 KM
Temp (^o F)		43
Relative Humidity		100
H2O (CM)		20
CO2 (CM)		413.2
N2O (CM)		3.62
O3 (CM)		. 849
General Scattering		.73
Optimum Scattering	A	.03
	B	.9146

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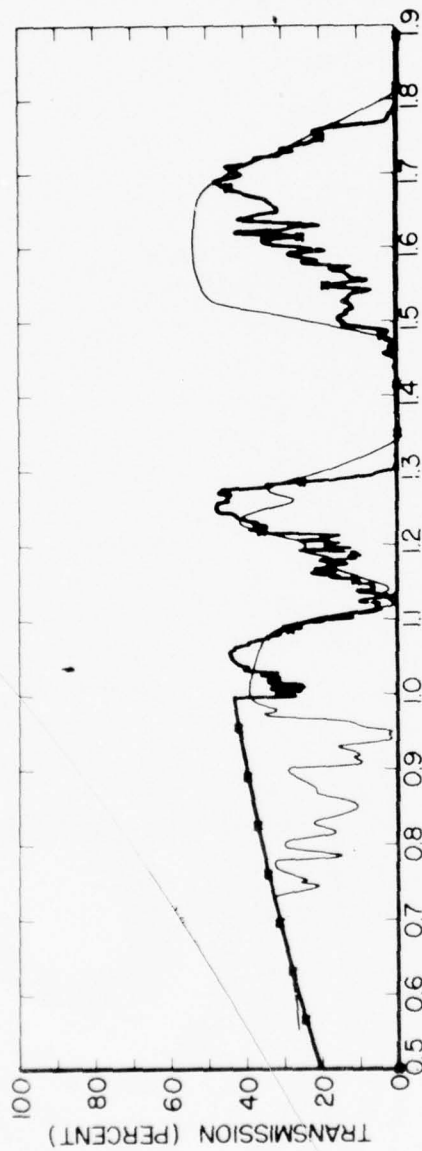


Plate 9 Optimum Scattering

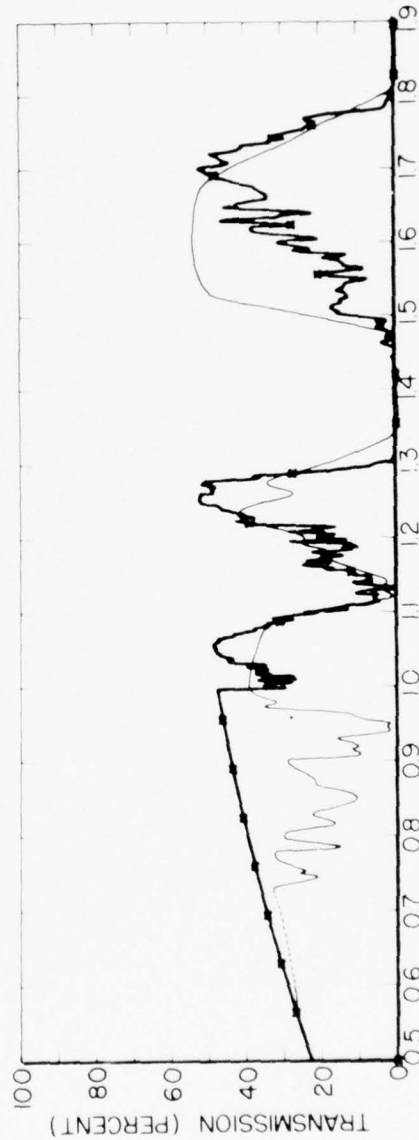
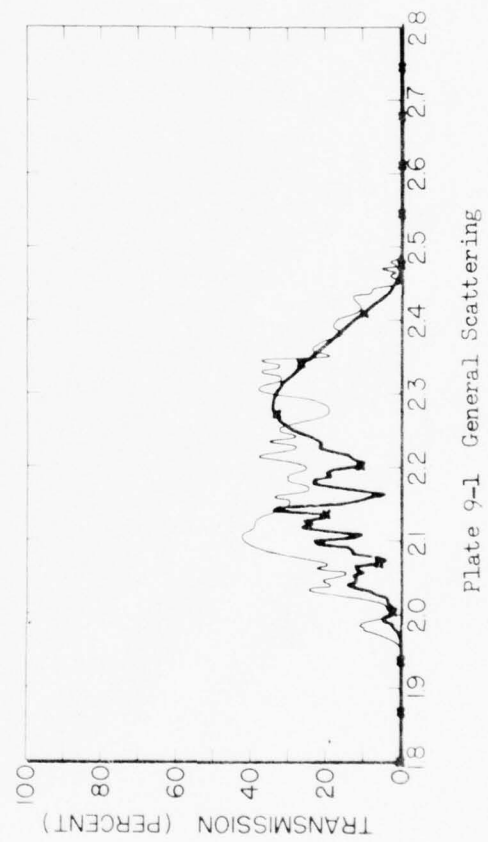
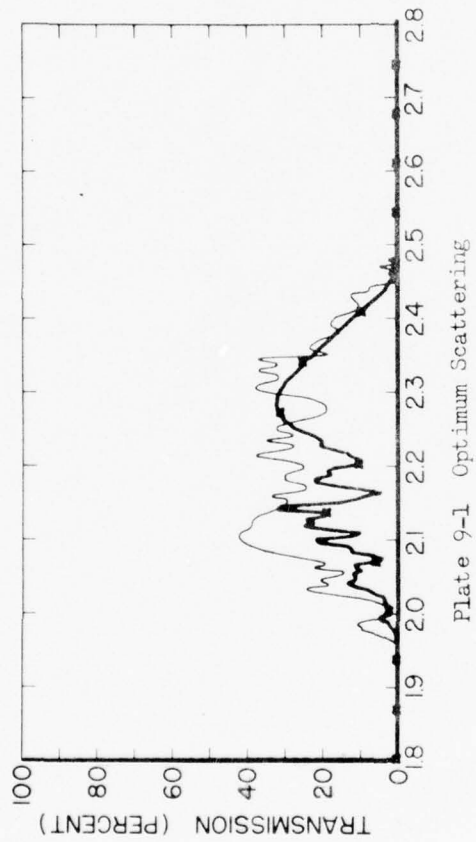


Plate 9 General Scattering

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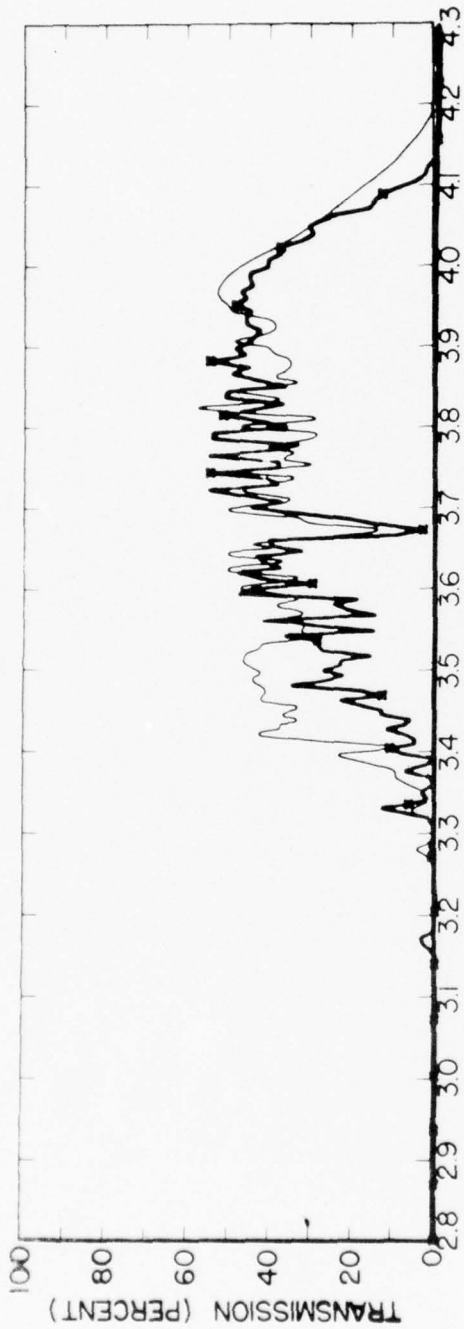


Plate 9-2 Optimum Scattering

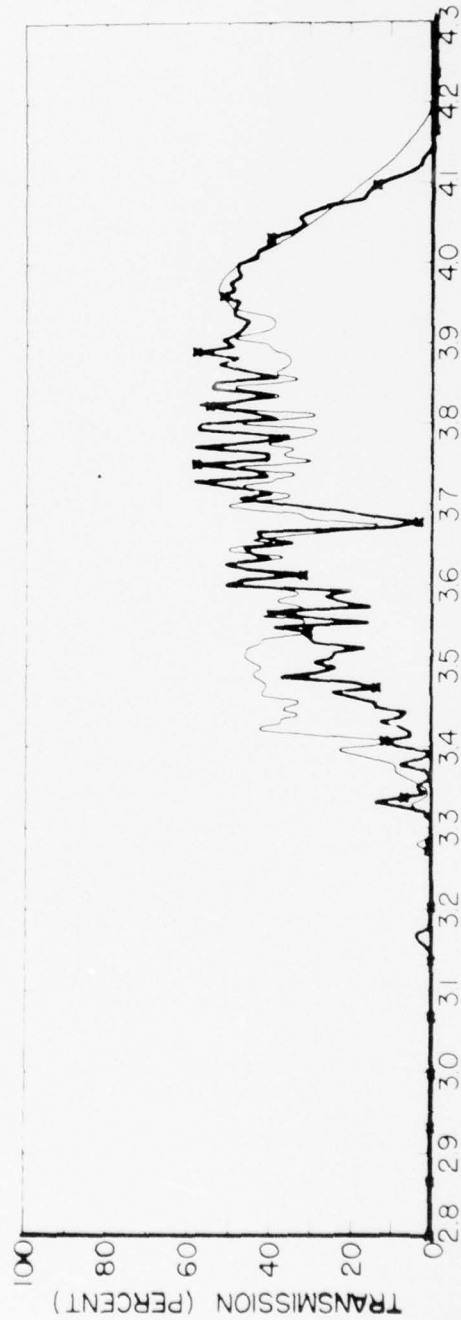
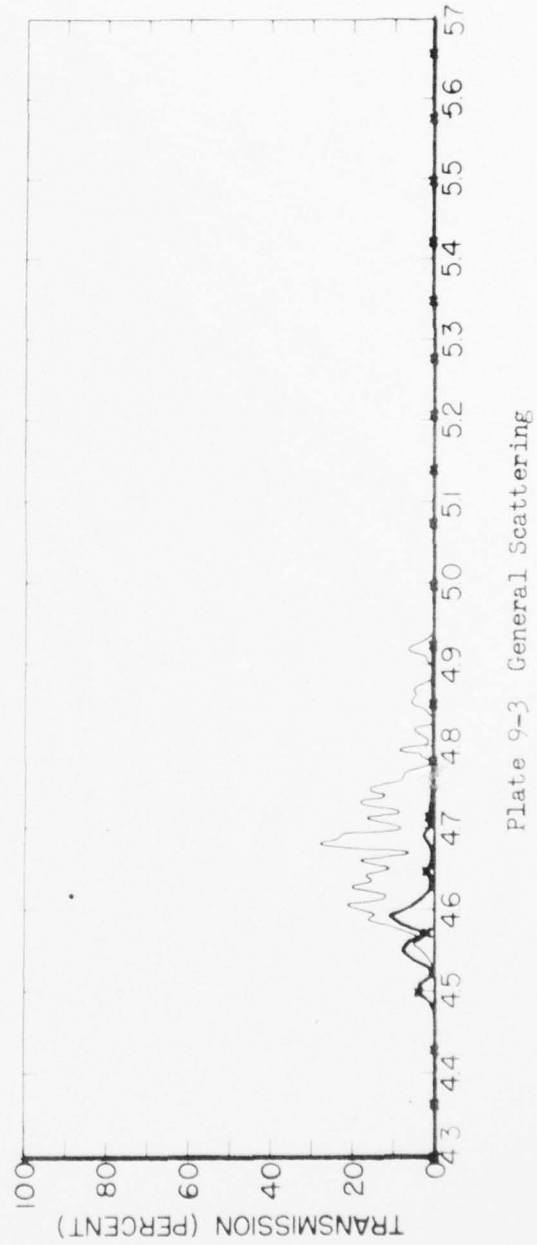
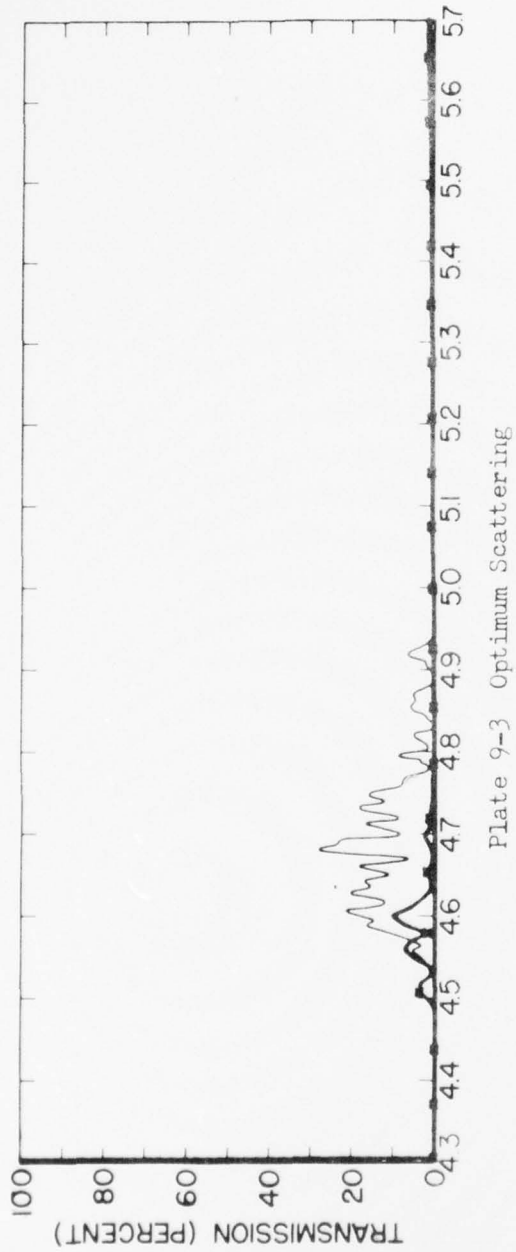


Plate 9-2 General Scattering

D-28

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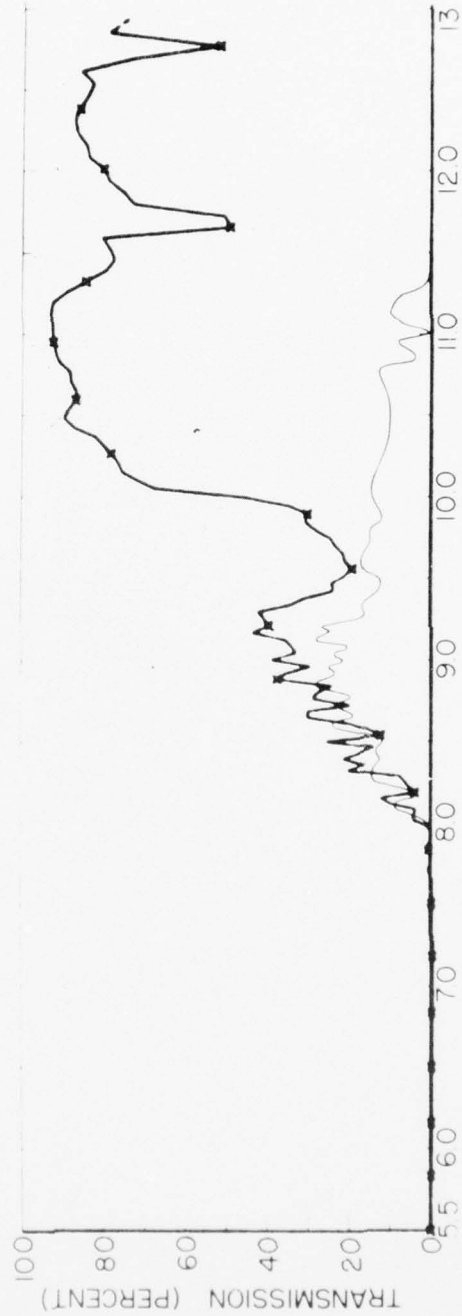
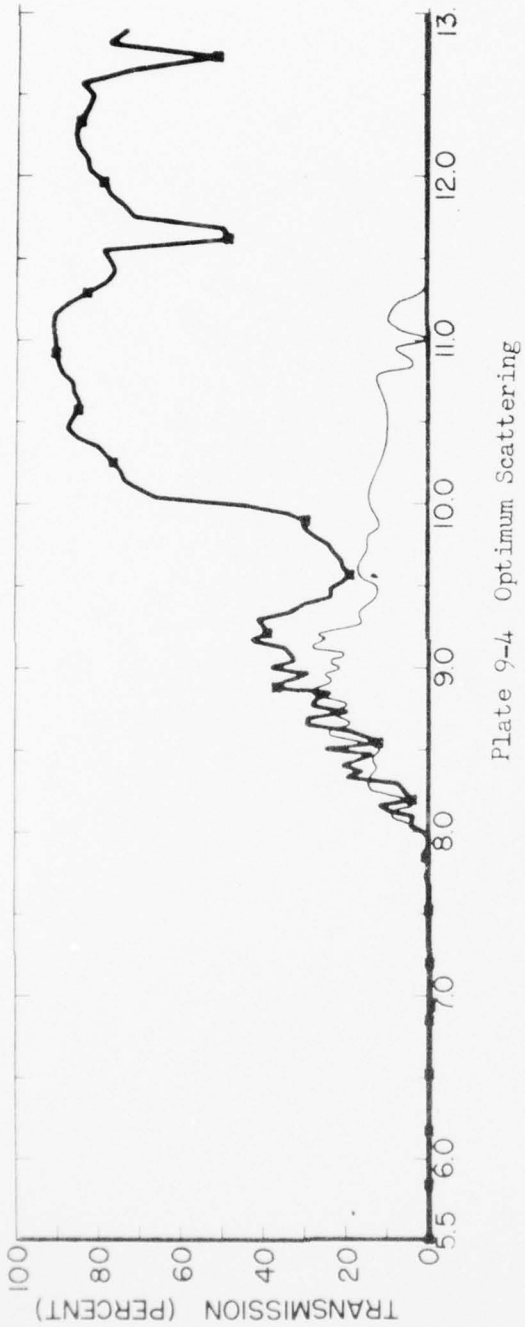


Plate 9-4 General Scattering

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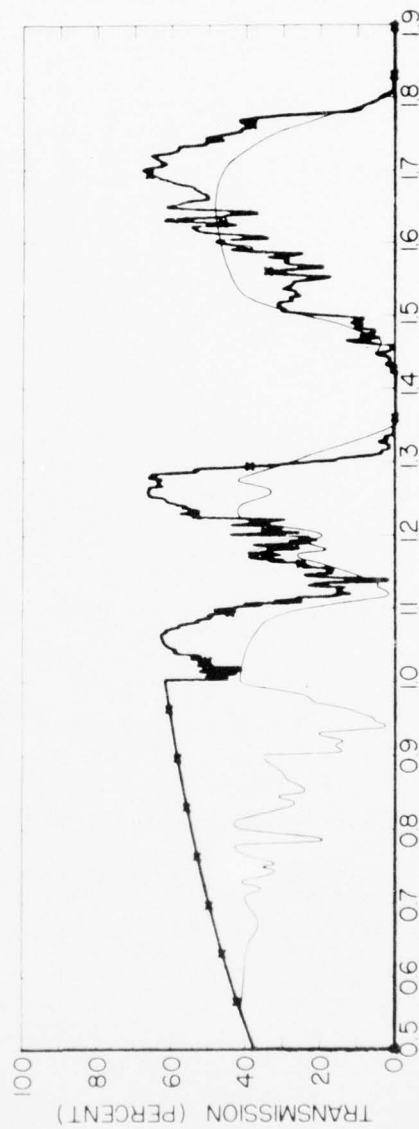
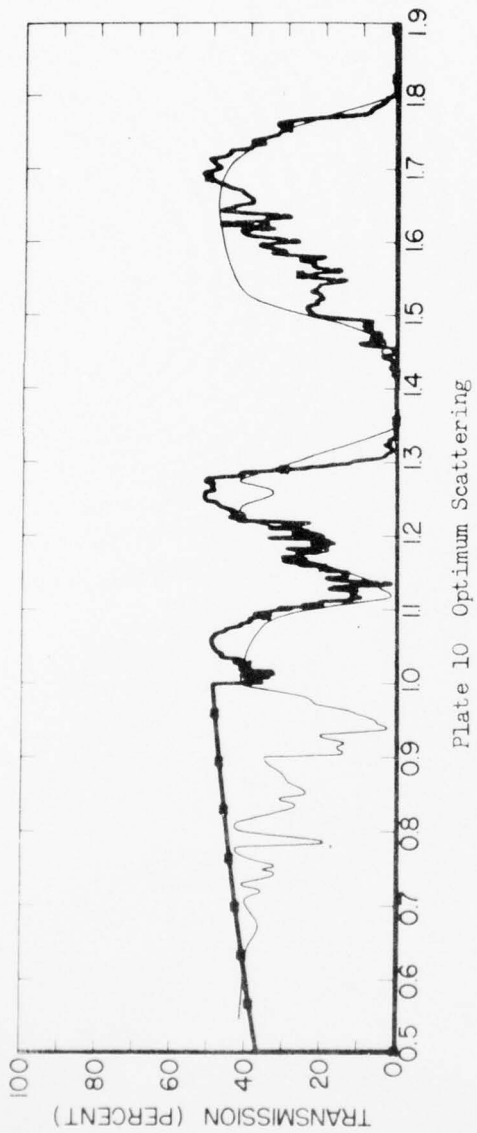


Yates and Taylor Measurements Plate #10

Range (KM)		10
Altitude (KM)		27.7
Temp (°F)		
Relative Humidity		
H2O (CM)		10.5
CO2 (CM)		413.7
N2O (CM)		3.62
O3 (CM)		.849
General Scattering		.49
Optimum Scattering	A	.0258
	B	.4750

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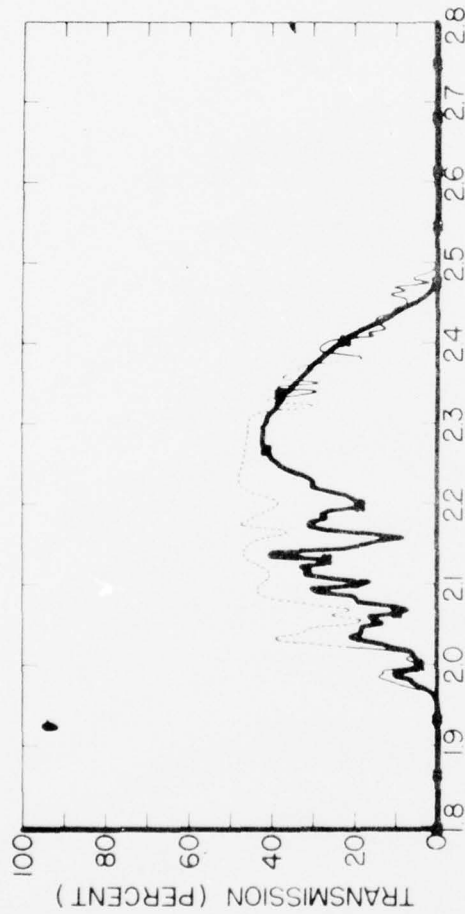


Plate 10-1 Optimum Scattering

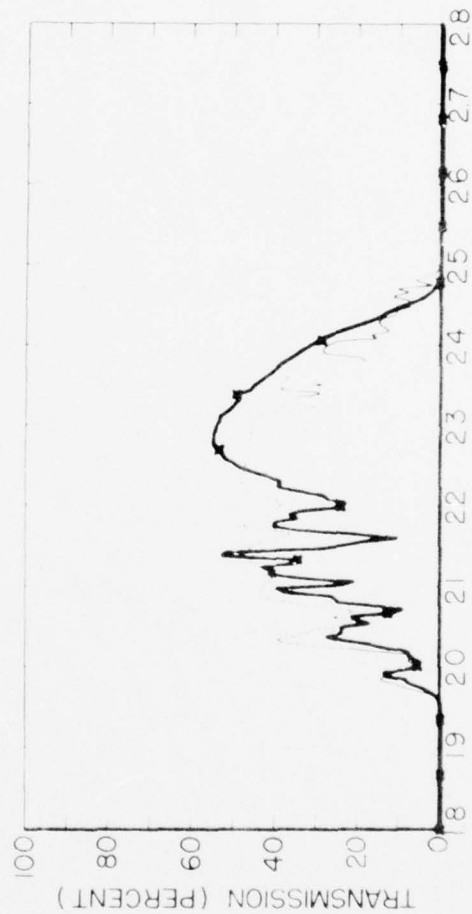
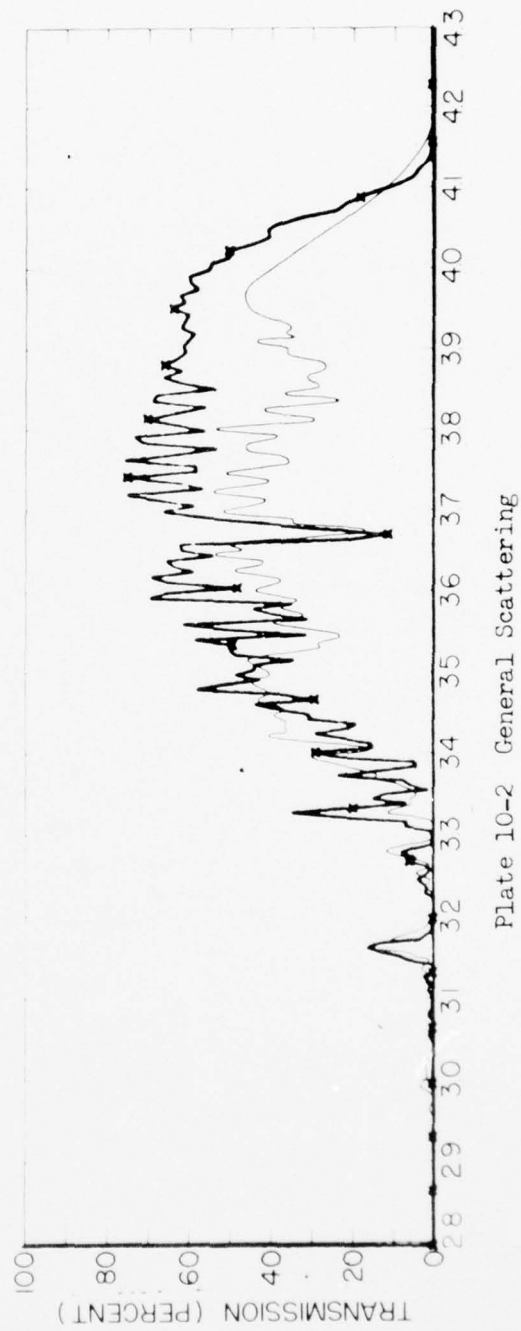
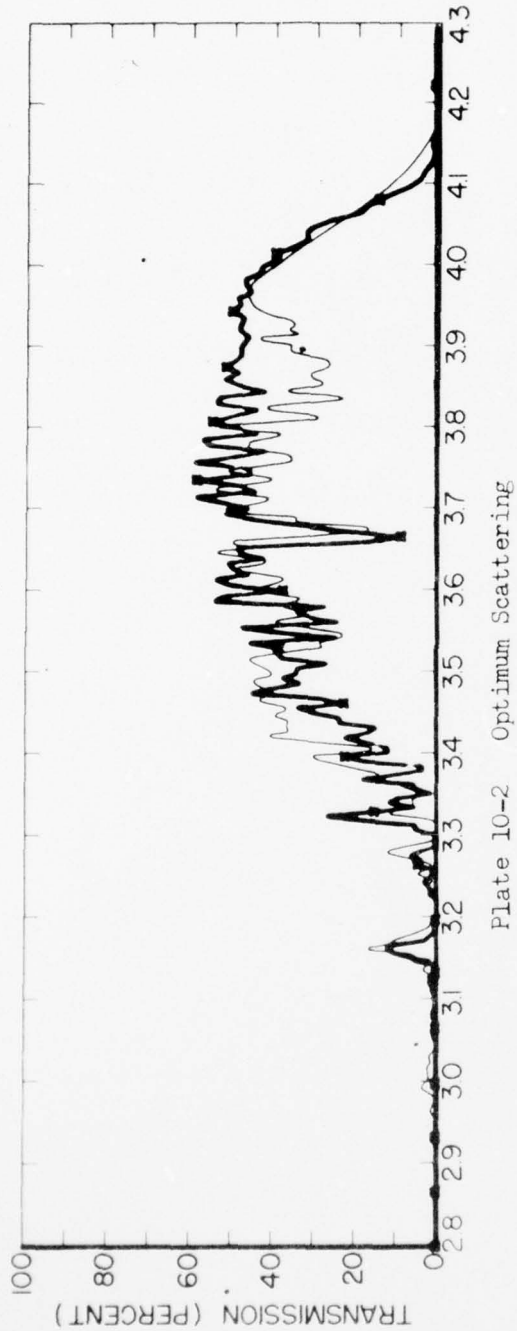


Plate 10-1 General Scattering

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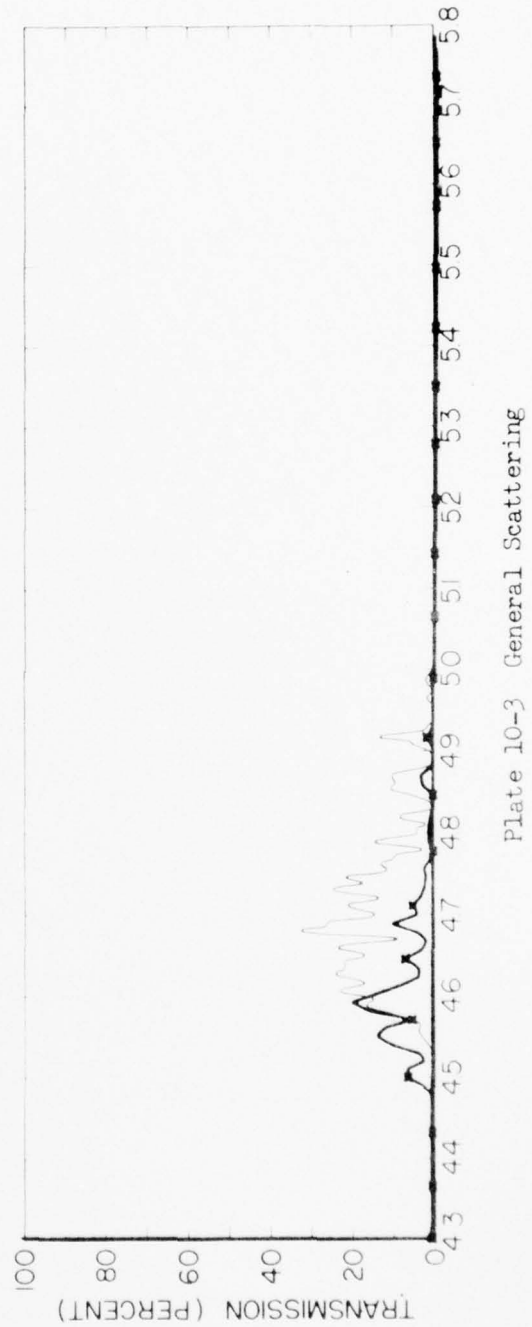
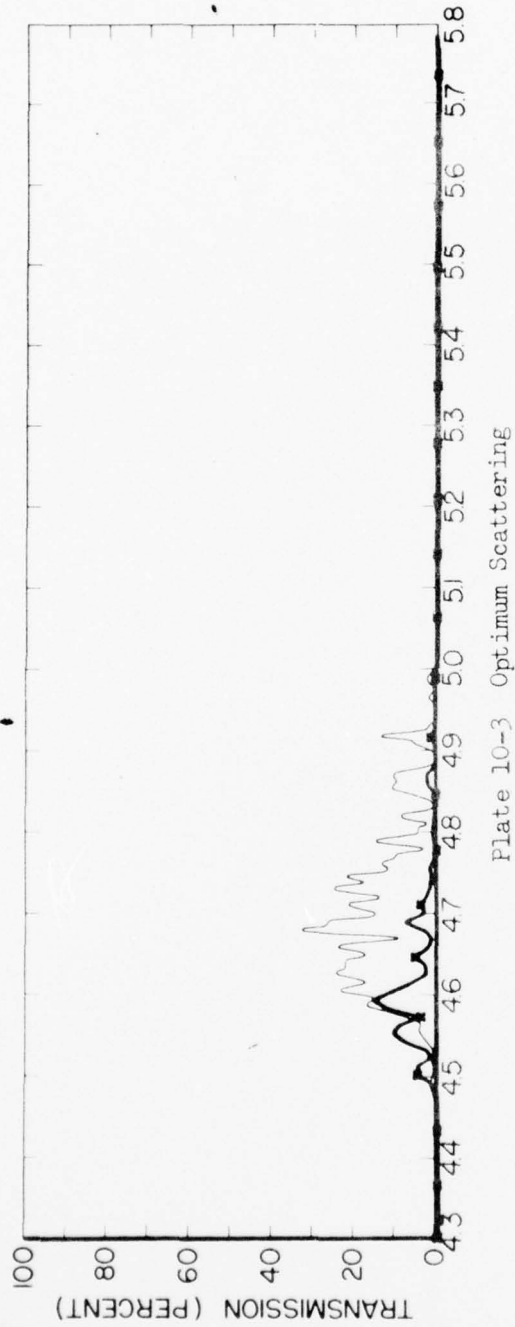
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D-34

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D-35

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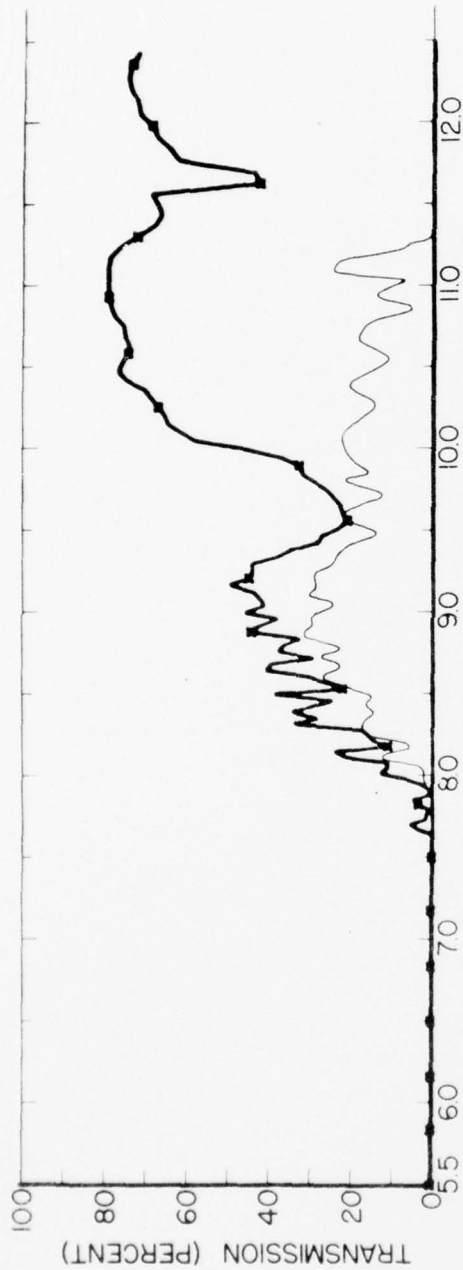


Plate 10-4 Optimum Scattering

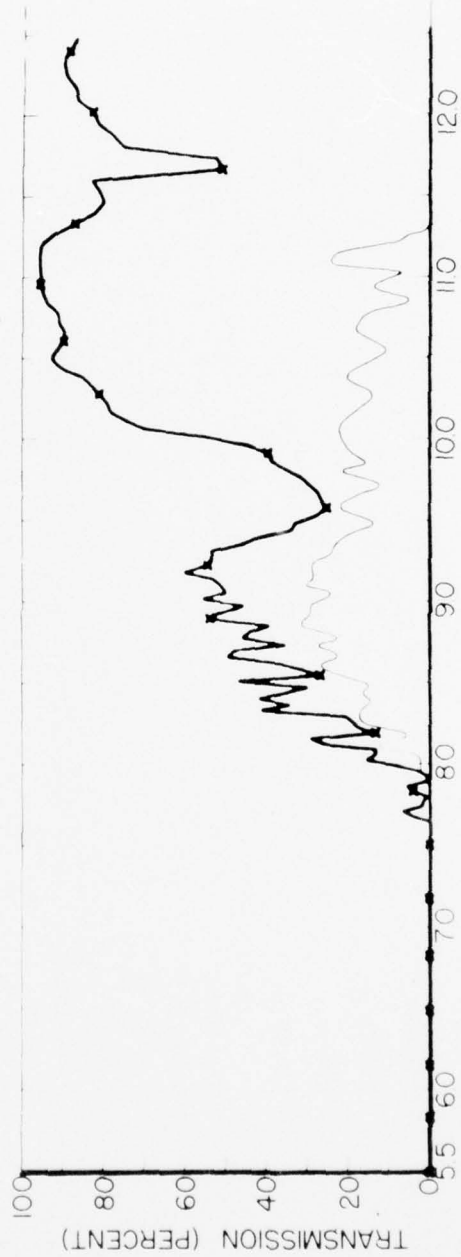


Plate 10-4 General Scattering

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Yates and Taylor Measurements Plate #11

Range (KM)		.3
Altitude (K ft)		S.L.
Temp (^o F)		-
Relative Humidity		-
H2O (CM)		.57
CO2 (CM)		9.
N2O (CM)		.084
O3 (CM)		.009
General Scattering		0
Optimum Scattering	A	No Scattering
	B	Range too small

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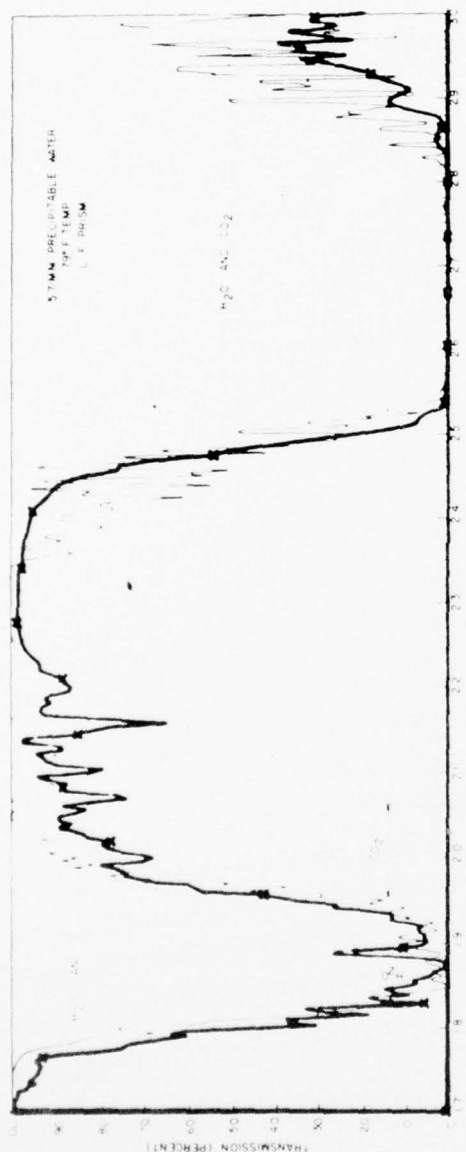


Plate 11-1 Optimum Scattering

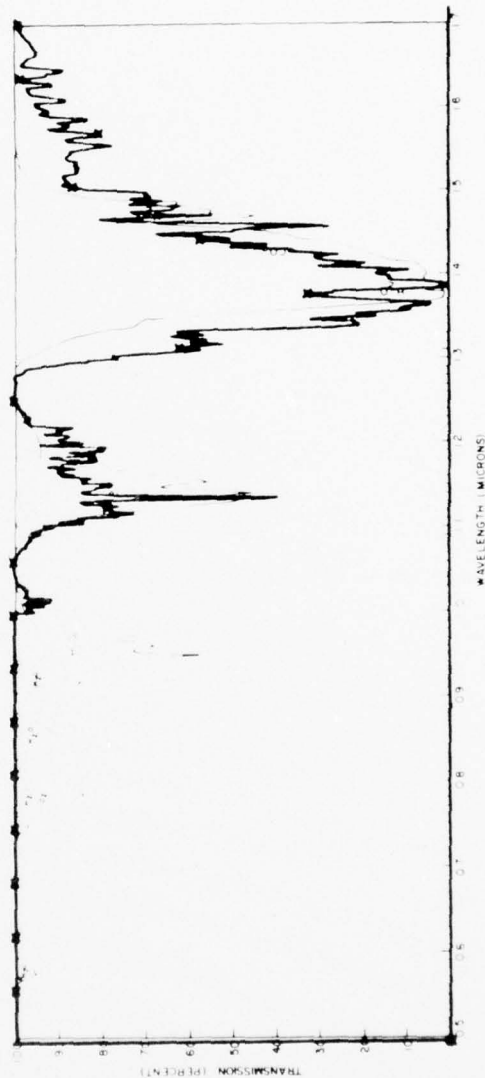


Plate 11-1 General Scattering

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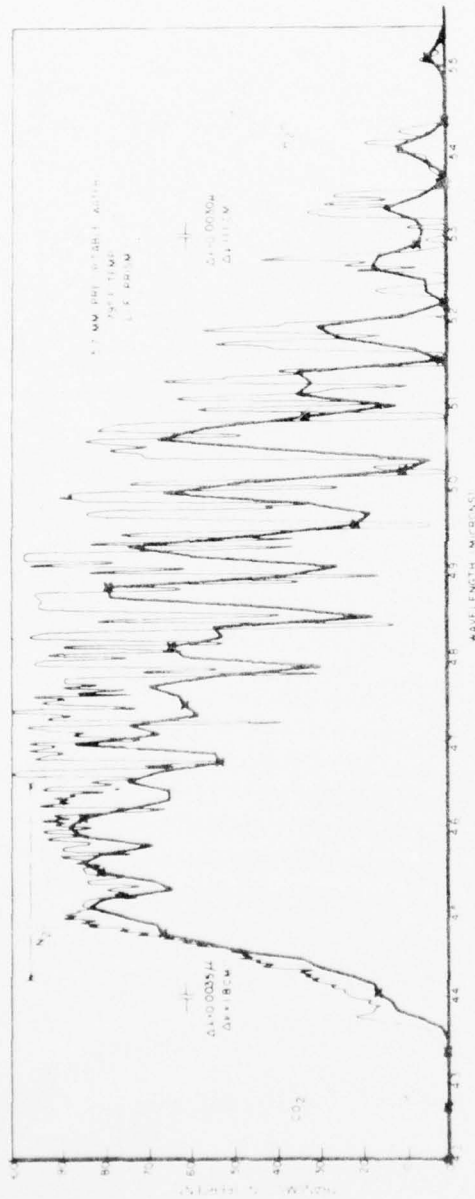


Plate 11-3 Optimum Scattering

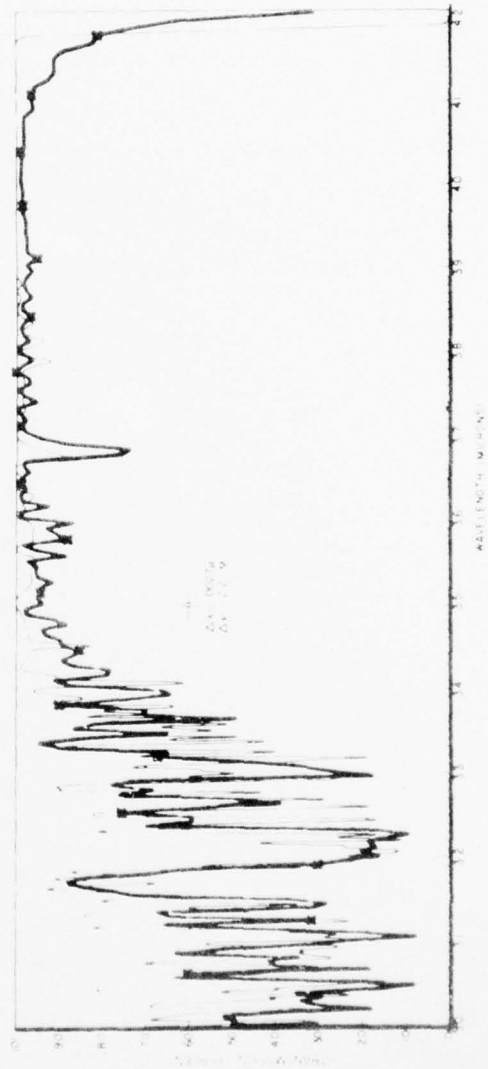


Plate 11-2 General Scattering

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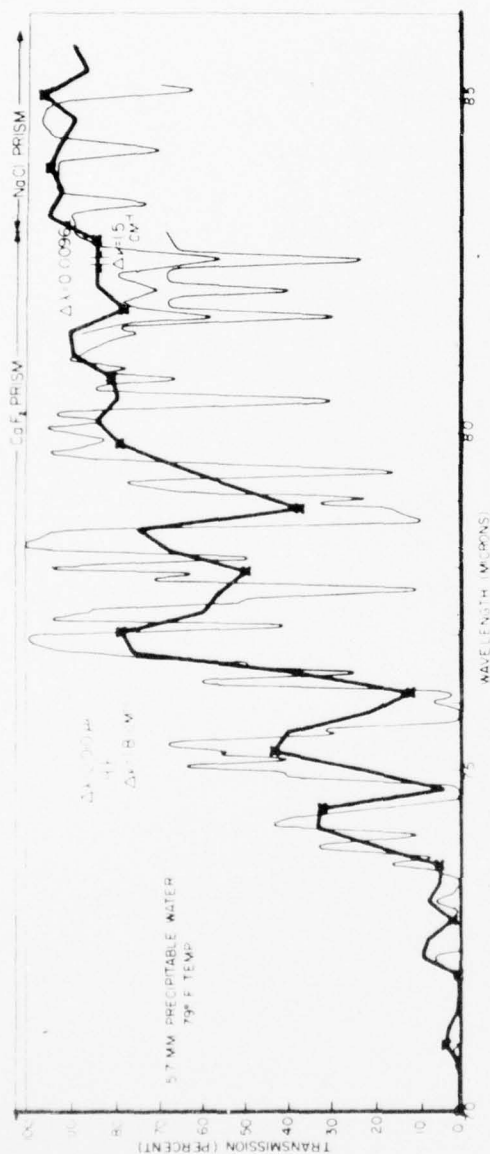


Plate 11-5 Optimum Scattering

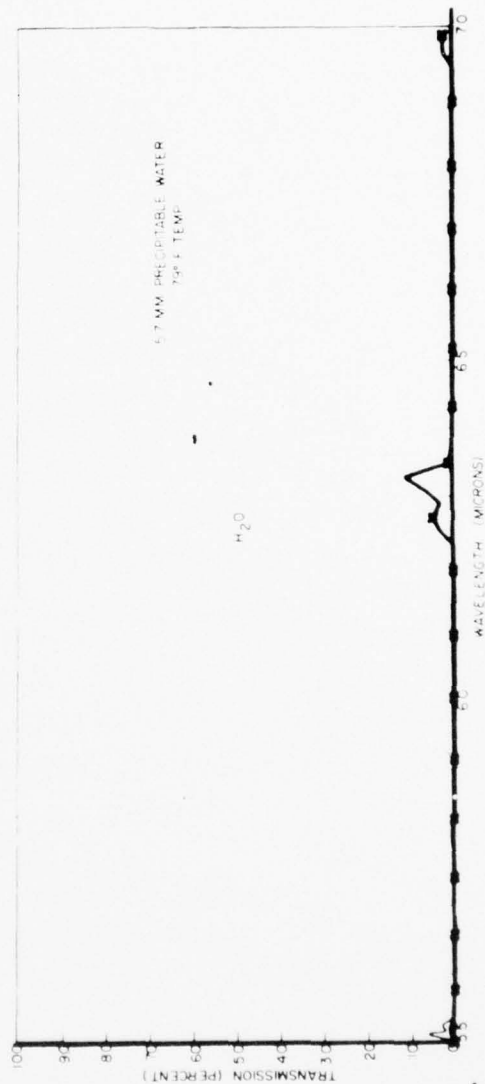


Plate 11-4 General Scattering

D-40

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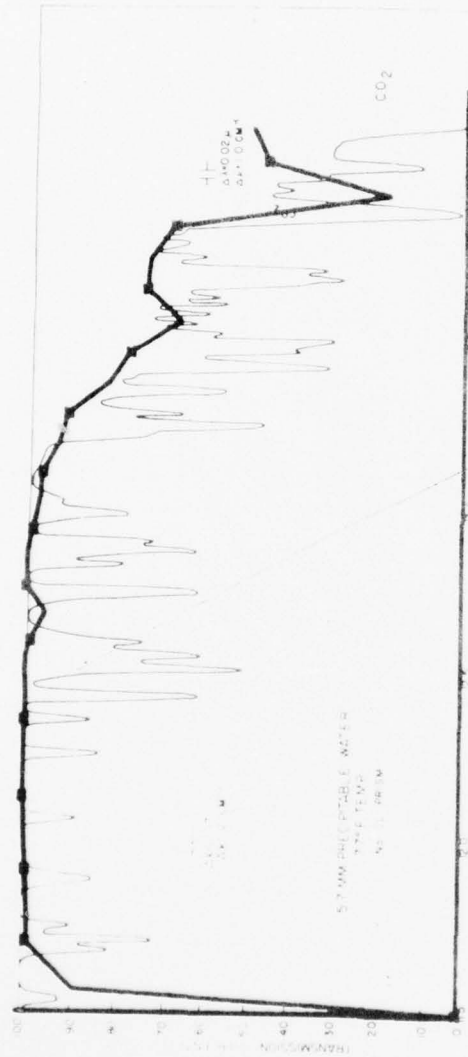


Plate 11-7 Optimum Scattering

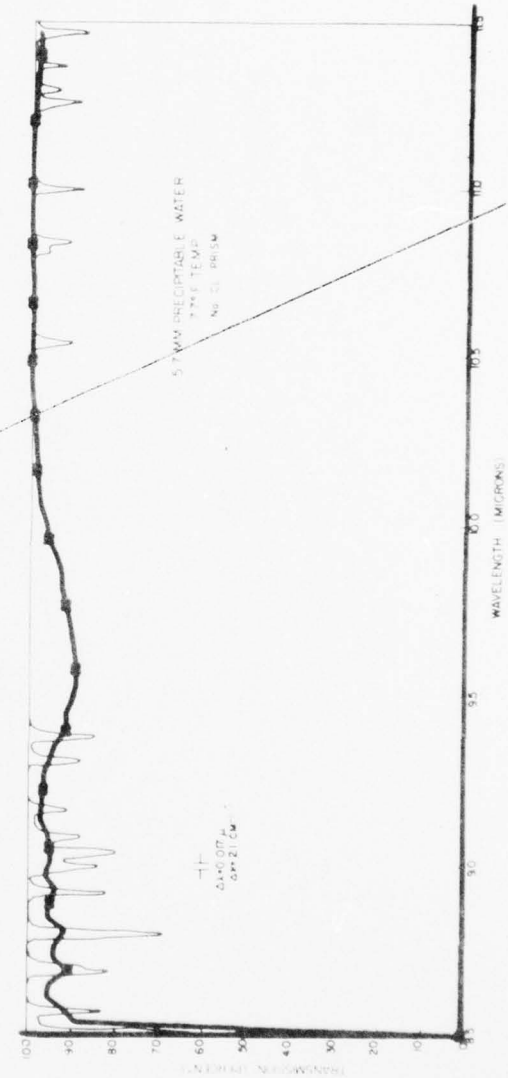


Plate 11-6 General Scattering

D-41

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APPENDIX E

Hot water vapor Emission Data for the Range 50 cm^{-1} to 9300 cm^{-1} .

This appendix presents the Hot water Emission Data as given in this report:

C. B. Ludwig, Measurements of the Curves of Growth of
Hot Water Vapor, Applied Optics, May 1971, Vol. 10.
No. 5.

The data is given as a function of temperature and wavenumber in tabular form. The equations utilizing this data are given Section 3.4.

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HIDE REVISED WAVELENGTH RESOLUTION EMISSION AND TRANSMISSION MO--ETC(U)
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ν , cm^{-1}	k (per cm at STP)						
	300 K	600 K	1000 K	1500 K	2000 K	2500 K	3000 K
50.	0.950E-00	0.103E-00	0.420E-01	0.114E-01	0.450E-02	0.300E-02	0.190E-02
75.	0.208E-01	0.565E-00	0.113E-00	0.375E-01	0.195E-01	0.134E-01	0.670E-02
100.	0.386E-01	0.990E-00	0.300E-00	0.104E-00	0.577E-01	0.365E-01	0.211E-01
125.	0.650E-01	0.201E-01	0.650E-00	0.214E-00	0.128E-00	0.845E-01	0.529E-01
150.	0.825E-01	0.325E-01	0.121E-01	0.415E-00	0.260E-00	0.168E-00	0.109E-00
175.	0.870E-01	0.452E-01	0.150E-01	0.765E-00	0.450E-00	0.289E-00	0.194E-00
200.	0.810E-01	0.540E-01	0.261E-01	0.126E-01	0.695E-00	0.460E-00	0.309E-00
225.	0.682E-01	0.600E-01	0.337E-01	0.176E-01	0.101E-01	0.679E-00	0.454E-00
250.	0.493E-01	0.622E-01	0.407E-01	0.230E-01	0.135E-01	0.935E-00	0.620E-00
275.	0.316E-01	0.592E-01	0.456E-01	0.281E-01	0.172E-01	0.122E-01	0.822E-00
300.	0.190E-01	0.528E-01	0.479E-01	0.328E-01	0.213E-01	0.149E-01	0.191E-01
325.	0.113E-01	0.450E-01	0.484E-01	0.361E-01	0.249E-01	0.179E-01	0.128E-01
350.	0.585E-00	0.370E-01	0.471E-01	0.383E-01	0.284E-01	0.208E-01	0.154E-01
375.	0.294E-00	0.280E-01	0.443E-01	0.394E-01	0.312E-01	0.237E-01	0.182E-01
400.	0.138E-00	0.205E-01	0.400E-01	0.296E-01	0.330E-01	0.260E-01	0.207E-01
425.	0.620E-01	0.148E-01	0.347E-01	0.388E-01	0.341E-01	0.280E-01	0.229E-01
450.	0.255E-01	0.950E-00	0.292E-01	0.370E-01	0.345E-01	0.295E-01	0.248E-01
475.	0.940E-02	0.610E-00	0.236E-01	0.313E-01	0.342E-01	0.304E-01	0.262E-01
500.	0.340E-02	0.386E-00	0.188E-01	0.310E-01	0.334E-01	0.309E-01	0.273E-01
525.	0.105E-02	0.236E-00	0.145E-01	0.274E-01	0.319E-01	0.307E-01	0.280E-01
550.	0.350E-03	0.144E-00	0.110E-01	0.238E-01	0.300E-01	0.301E-01	0.283E-01
575.	0.126E-03	0.820E-01	0.818E-00	0.204E-01	0.276E-01	0.289E-01	0.282E-01
600.	0.430E-04	0.445E-01	0.598E-00	0.174E-01	0.248E-01	0.275E-01	0.277E-01
625.	0.150E-04	0.242E-01	0.427E-00	0.145E-01	0.222E-01	0.260E-01	0.269E-01
650.	0.510E-05	0.127E-01	0.294E-00	0.118E-01	0.195E-01	0.241E-01	0.258E-01
675.	0.170E-05	0.630E-02	0.290E-00	0.550E-00	0.169E-01	0.221E-01	0.245E-01
700.	0.570E-06	0.300E-02	0.134E-00	0.748E-00	0.146E-01	0.200E-01	0.229E-01
725.	0.195E-06	0.140E-02	0.902E-01	0.580E-00	0.124E-01	0.178E-01	0.213E-01
750.	0.680E-07	0.620E-03	0.590E-01	0.413E-00	0.103E-01	0.156E-01	0.196E-01
775.	0.385E-07	0.275E-03	0.450E-01	0.330E-00	0.845E-00	0.136E-01	0.177E-01
800.	0.670E-07	0.112E-03	0.355E-01	0.242E-00	0.695E-00	0.117E-01	0.159E-01
825.	0.113E-06	0.590E-04	0.289E-01	0.174E-00	0.560E-00	0.106E-01	0.143E-01
850.	0.195E-06	0.230E-04	0.245E-01	0.125E-00	0.450E-00	0.855E-00	0.126E-01
875.	0.328E-06	0.103E-04	0.214E-01	0.100E-00	0.457E-00	0.718E-00	0.111E-01
900.	0.560E-06	0.460E-05	0.189E-01	0.830E-01	0.278E-00	0.595E-00	0.955E-00
925.	0.950E-06	0.295E-05	0.174E-01	0.730E-01	0.259E-00	0.492E-00	0.825E-00
950.	0.160E-05	0.140E-05	0.166E-01	0.665E-01	0.211E-00	0.405E-00	0.705E-00
975.	0.275E-05	0.350E-05	0.165E-01	0.630E-01	0.195E-00	0.352E-00	0.600E-00
1000.	0.470E-05	0.540E-05	0.167E-01	0.620E-01	0.190E-00	0.312E-00	0.510E-00
1025.	0.810E-05	0.215E-04	0.175E-01	0.630E-01	0.191E-00	0.289E-00	0.425E-00
1050.	0.130E-04	0.570E-04	0.188E-01	0.675E-01	0.194E-00	0.284E-00	0.354E-00
1075.	0.235E-04	0.150E-04	0.208E-01	0.745E-01	0.202E-00	0.284E-00	0.320E-00
1100.	0.400E-04	0.380E-04	0.233E-01	0.865E-01	0.220E-00	0.313E-00	0.357E-00
1125.	0.680E-04	0.950E-04	0.268E-01	0.122E-00	0.260E-00	0.380E-00	0.449E-00
1150.	0.120E-03	0.235E-03	0.343E-01	0.176E-00	0.328E-00	0.461E-00	0.567E-00
1175.	0.200E-03	0.620E-03	0.678E-01	0.254E-00	0.411E-00	0.541E-00	0.685E-00
1200.	0.365E-03	0.118E-01	0.107E-00	0.330E-00	0.458E-00	0.542E-00	0.641E-00
1225.	0.650E-03	0.330E-01	0.169E-00	0.405E-00	0.487E-00	0.571E-00	0.672E-00
1250.	0.130E-02	0.635E-01	0.214E-00	0.458E-00	0.535E-00	0.567E-00	0.637E-00
1275.	0.250E-02	0.124E-00	0.344E-00	0.477E-00	0.562E-00	0.562E-00	0.628E-00
1300.	0.590E-02	0.212E-00	0.407E-00	0.547E-00	0.591E-00	0.514E-00	0.578E-00
1325.	0.103E-01	0.285E-00	0.489E-00	0.592E-00	0.497E-00	0.486E-00	0.534E-00
1350.	0.219E-01	0.328E-00	0.494E-00	0.558E-00	0.489E-00	0.484E-00	0.537E-00
1375.	0.485E-01	0.345E-00	0.505E-00	0.521E-00	0.477E-00	0.484E-00	0.520E-00
1400.	0.114E-00	0.361E-00	0.538E-00	0.555E-00	0.503E-00	0.502E-00	0.516E-00
1425.	0.249E-00	0.460E-00	0.621E-00	0.624E-00	0.584E-00	0.584E-00	0.544E-00
1450.	0.397E-00	0.569E-00	0.749E-00	0.768E-00	0.784E-00	0.567E-00	0.548E-00
1475.	0.418E-00	0.627E-00	0.821E-00	0.849E-00	0.840E-00	0.594E-00	0.569E-00
1500.	0.108E-01	0.125E-01	0.113E-01	0.940E-00	0.867E-00	0.664E-00	0.525E-00
1525.	0.163E-01	0.152E-01	0.118E-01	0.670E-00	0.762E-00	0.484E-00	0.430E-00
1550.	0.142E-01	0.675E-00	0.557E-00	0.549E-00	0.276E-00	0.263E-00	0.277E-00
1575.	0.451E-00	0.292E-00	0.132E-00	0.118E-00	0.134E-00	0.156E-00	0.173E-00

UNCLASSIFIED

UNCLASSIFIED



1600.	0.603E-01	0.538E-01	0.863E-01	0.112E-00	0.120E-00	0.125E-00	0.125E-00
1625.	0.501E-00	0.252E-00	0.118E-00	0.112E-00	0.131E-00	0.110E-00	0.110E-00
1650.	0.730E-00	0.480E-00	0.237E-00	0.190E-00	0.171E-00	0.170E-00	0.170E-00
1675.	0.119E-01	0.508E-00	0.291E-00	0.258E-00	0.219E-00	0.201E-00	0.202E-00
1700.	0.100E-01	0.553E-00	0.431E-00	0.310E-00	0.260E-00	0.220E-00	0.170E-00
1725.	0.802E-00	0.651E-00	0.528E-00	0.411E-00	0.309E-00	0.210E-00	0.141E-00
1750.	0.580E-00	0.527E-00	0.460E-00	0.378E-00	0.322E-00	0.284E-00	0.240E-00
1775.	0.330E-00	0.406E-00	0.430E-00	0.330E-00	0.318E-00	0.270E-00	0.230E-00
1800.	0.250E-00	0.363E-00	0.405E-00	0.312E-00	0.301E-00	0.270E-00	0.242E-00
1825.	0.147E-00	0.219E-00	0.312E-00	0.318E-00	0.291E-00	0.268E-00	0.250E-00
1850.	0.910E-01	0.232E-00	0.298E-00	0.295E-00	0.269E-00	0.233E-00	0.217E-00
1875.	0.580E-01	0.158E-00	0.214E-00	0.214E-00	0.214E-00	0.214E-00	0.218E-00
1900.	0.370E-01	0.113E-00	0.184E-00	0.218E-00	0.214E-00	0.218E-00	0.222E-00
1925.	0.241E-01	0.118E-00	0.156E-00	0.188E-00	0.195E-00	0.208E-00	0.206E-00
1950.	0.162E-01	0.606E-01	0.970E-01	0.131E-00	0.160E-00	0.179E-00	0.183E-00
1975.	0.112E-01	0.425E-01	0.963E-01	0.153E-00	0.148E-00	0.156E-00	0.166E-00
2000.	0.780E-02	0.400E-01	0.763E-01	0.112E-00	0.129E-00	0.137E-00	0.147E-00
2025.	0.510E-02	0.352E-01	0.647E-01	0.876E-01	0.110E-00	0.118E-00	0.129E-00
2050.	0.380E-02	0.252E-01	0.507E-01	0.705E-01	0.888E-01	0.100E-00	0.111E-00
2075.	0.260E-02	0.179E-01	0.377E-01	0.546E-01	0.724E-01	0.828E-01	0.990E-01
2100.	0.180E-02	0.123E-01	0.291E-01	0.413E-01	0.608E-01	0.680E-01	0.806E-01
2125.	0.137E-02	0.850E-02	0.212E-01	0.378E-01	0.579E-01	0.610E-01	0.723E-01
2150.	0.880E-03	0.630E-02	0.152E-01	0.275E-01	0.449E-01	0.521E-01	0.628E-01
2175.	0.620E-03	0.400E-02	0.107E-01	0.214E-01	0.374E-01	0.453E-01	0.530E-01
2200.	0.450E-03	0.298E-02	0.931E-02	0.180E-01	0.329E-01	0.406E-01	0.453E-01
2225.	0.405E-03	0.175E-02	0.696E-02	0.152E-01	0.293E-01	0.365E-01	0.398E-01
2250.	0.321E-03	0.120E-02	0.452E-02	0.101E-01	0.232E-01	0.331E-01	0.350E-01
2275.	0.229E-03	0.721E-03	0.364E-02	0.930E-02	0.225E-01	0.306E-01	0.312E-01
2300.	0.193E-03	0.544E-03	0.318E-02	0.750E-02	0.202E-01	0.284E-01	0.290E-01
2325.	0.154E-03	0.375E-03	0.183E-02	0.603E-02	0.173E-01	0.269E-01	0.274E-01
2350.	0.101E-03	0.263E-03	0.119E-02	0.480E-02	0.147E-01	0.223E-01	0.267E-01
2375.	0.832E-04	0.185E-03	0.909E-03	0.360E-02	0.133E-01	0.210E-01	0.259E-01
2400.	0.763E-04	0.137E-03	0.711E-03	0.316E-02	0.122E-01	0.207E-01	0.252E-01
2425.	0.615E-04	0.120E-03	0.610E-03	0.257E-02	0.101E-01	0.218E-01	0.251E-01
2450.	0.480E-04	0.113E-03	0.518E-03	0.201E-02	0.920E-02	0.200E-01	0.240E-01
2475.	0.372E-04	0.106E-03	0.435E-03	0.168E-02	0.785E-02	0.183E-01	0.247E-01
2500.	0.355E-04	0.101E-03	0.376E-03	0.168E-02	0.669E-02	0.160E-01	0.218E-01
2525.	0.338E-04	0.990E-04	0.366E-03	0.167E-02	0.631E-02	0.156E-01	0.249E-01
2550.	0.350E-04	0.102E-03	0.376E-03	0.167E-02	0.641E-02	0.152E-01	0.251E-01
2575.	0.422E-04	0.106E-03	0.373E-03	0.168E-02	0.656E-02	0.150E-01	0.238E-01
2600.	0.521E-04	0.111E-03	0.371E-03	0.170E-02	0.673E-02	0.152E-01	0.258E-01
2625.	0.616E-04	0.121E-03	0.384E-03	0.179E-02	0.798E-02	0.179E-01	0.263E-01
2650.	0.742E-04	0.129E-03	0.479E-03	0.201E-02	0.788E-02	0.175E-01	0.270E-01
2675.	0.933E-04	0.165E-03	0.544E-03	0.249E-02	0.945E-02	0.204E-01	0.280E-01
2700.	0.101E-03	0.190E-03	0.761E-03	0.324E-02	0.106E-01	0.231E-01	0.295E-01
2725.	0.147E-03	0.272E-03	0.892E-03	0.441E-02	0.125E-01	0.257E-01	0.318E-01
2750.	0.195E-03	0.326E-03	0.100E-02	0.499E-02	0.147E-01	0.295E-01	0.343E-01
2775.	0.261E-03	0.421E-03	0.145E-02	0.582E-02	0.161E-01	0.306E-01	0.378E-01
2800.	0.295E-03	0.513E-03	0.191E-02	0.731E-02	0.185E-01	0.363E-01	0.417E-01
2825.	0.362E-03	0.643E-03	0.257E-02	0.820E-02	0.203E-01	0.373E-01	0.479E-01
2850.	0.507E-03	0.850E-03	0.271E-02	0.888E-02	0.233E-01	0.471E-01	0.501E-01
2875.	0.799E-03	0.118E-02	0.322E-02	0.110E-01	0.262E-01	0.451E-01	0.790E-01
2900.	0.665E-03	0.160E-02	0.781E-02	0.126E-01	0.292E-01	0.509E-01	0.702E-01
2925.	0.108E-02	0.231E-02	0.451E-02	0.140E-01	0.306E-01	0.705E-01	0.655E-01
2950.	0.192E-02	0.271E-02	0.563E-02	0.159E-01	0.337E-01	0.620E-01	0.735E-01
2975.	0.263E-02	0.300E-02	0.625E-02	0.179E-01	0.385E-01	0.665E-01	0.891E-01
3000.	0.295E-02	0.330E-02	0.701E-02	0.203E-01	0.460E-01	0.782E-01	0.885E-01
3025.	0.310E-02	0.370E-02	0.816E-02	0.220E-01	0.519E-01	0.889E-01	0.970E-01
3050.	0.510E-02	0.400E-02	0.969E-02	0.279E-01	0.602E-01	0.109E-00	0.106E-00
3075.	0.730E-02	0.459E-02	0.111E-01	0.277E-01	0.676E-01	0.106E-00	0.117E-00
3100.	0.900E-02	0.480E-02	0.157E-01	0.372E-01	0.561E-01	0.153E-00	0.129E-00
3125.	0.100E-02	0.590E-02	0.162E-01	0.471E-01	0.100E-00	0.142E-00	0.142E-00
3150.	0.610E-03	0.550E-02	0.205E-01	0.320E-01	0.122E-00	0.168E-00	0.155E-00
3175.	0.160E-02	0.600E-02	0.247E-01	0.521E-01	0.131E-00	0.177E-00	0.170E-00
3200.	0.370E-02	0.700E-02	0.284E-01	0.770E-01	0.153E-00	0.184E-00	0.187E-00
3225.	0.410E-02	0.860E-02	0.376E-01	0.914E-01	0.166E-00	0.206E-00	0.202E-00
3250.	0.410E-02	0.103E-01	0.514E-01	0.117E-00	0.194E-00	0.225E-00	0.230E-00

UNCLASSIFIED



3275	0.290E-02	0.129E-01	0.664E-01	0.147E-00	0.220E-00	0.254E-00	0.241E-00
3300	0.220E-02	0.161E-01	0.834E-01	0.171E-00	0.237E-00	0.263E-00	0.262E-00
3325	0.230E-02	0.212E-01	0.104E-00	0.201E-00	0.268E-00	0.283E-00	0.280E-00
3350	0.250E-02	0.257E-01	0.143E-00	0.240E-00	0.294E-00	0.295E-00	0.294E-00
3375	0.310E-02	0.385E-01	0.169E-00	0.272E-00	0.312E-00	0.301E-00	0.302E-00
3400	0.420E-02	0.540E-01	0.211E-00	0.309E-00	0.329E-00	0.307E-00	0.308E-00
3425	0.600E-02	0.770E-01	0.267E-00	0.343E-00	0.332E-00	0.314E-00	0.309E-00
3450	0.940E-02	0.117E-00	0.333E-00	0.372E-00	0.344E-00	0.303E-00	0.290E-00
3475	0.165E-01	0.173E-00	0.365E-00	0.384E-00	0.353E-00	0.300E-00	0.272E-00
3500	0.360E-01	0.258E-00	0.458E-00	0.393E-00	0.315E-00	0.288E-00	0.265E-00
3525	0.720E-01	0.375E-00	0.540E-00	0.409E-00	0.294E-00	0.271E-00	0.241E-00
3550	0.133E-00	0.401E-00	0.490E-00	0.399E-00	0.281E-00	0.257E-00	0.222E-00
3575	0.215E-00	0.500E-00	0.443E-00	0.341E-00	0.251E-00	0.230E-00	0.208E-00
3600	0.318E-00	0.430E-00	0.346E-00	0.286E-00	0.243E-00	0.219E-00	0.201E-00
3625	0.442E-00	0.390E-00	0.334E-00	0.279E-00	0.234E-00	0.216E-00	0.210E-00
3650	0.473E-00	0.405E-00	0.347E-00	0.281E-00	0.234E-00	0.219E-00	0.213E-00
3675	0.568E-00	0.501E-00	0.423E-00	0.315E-00	0.243E-00	0.218E-00	0.206E-00
3700	0.690E-00	0.708E-00	0.673E-00	0.432E-00	0.268E-00	0.189E-00	0.150E-00
3725	0.617E-00	0.831E-00	0.566E-00	0.320E-00	0.194E-00	0.123E-00	0.113E-00
3750	0.181E-01	0.529E-00	0.260E-00	0.151E-00	0.124E-00	0.107E-00	0.105E-00
3775	0.136E-00	0.124E-00	0.120E-00	0.119E-00	0.115E-00	0.115E-00	0.109E-00
3800	0.453E-00	0.298E-00	0.167E-00	0.129E-00	0.123E-00	0.112E-00	0.122E-00
3825	0.760E-00	0.503E-00	0.242E-00	0.154E-00	0.129E-00	0.127E-00	0.136E-00
3850	0.836E-00	0.584E-00	0.277E-00	0.184E-00	0.161E-00	0.145E-00	0.154E-00
3875	0.840E-00	0.728E-00	0.422E-00	0.236E-00	0.197E-00	0.167E-00	0.177E-00
3900	0.505E-00	0.500E-00	0.379E-00	0.276E-00	0.227E-00	0.192E-00	0.197E-00
3925	0.117E-00	0.409E-00	0.423E-00	0.313E-00	0.243E-00	0.202E-00	0.209E-00
3950	0.460E-01	0.309E-00	0.358E-00	0.290E-00	0.230E-00	0.202E-00	0.207E-00
3975	0.184E-01	0.205E-00	0.269E-00	0.234E-00	0.193E-00	0.192E-00	0.190E-00
4000	0.730E-02	0.134E-00	0.186E-00	0.179E-00	0.159E-00	0.168E-00	0.161E-00
4025	0.537E-02	0.790E-01	0.113E-00	0.124E-00	0.124E-00	0.134E-00	0.132E-00
4050	0.283E-02	0.415E-01	0.662E-01	0.886E-01	0.103E-00	0.106E-00	0.104E-00
4075	0.226E-02	0.197E-01	0.367E-01	0.594E-01	0.801E-01	0.579E-01	0.860E-01
4100	0.155E-02	0.560E-02	0.211E-01	0.395E-01	0.503E-01	0.610E-01	0.710E-01
4125	0.103E-02	0.321E-02	0.119E-01	0.246E-01	0.354E-01	0.480E-01	0.598E-01
4150	0.821E-03	0.364E-02	0.759E-02	0.166E-01	0.258E-01	0.370E-01	0.499E-01
4175	0.752E-03	0.184E-02	0.445E-02	0.190E-01	0.179E-01	0.268E-01	0.418E-01
4200	0.429E-03	0.141E-02	0.354E-02	0.821E-02	0.142E-01	0.212E-01	0.348E-01
4225	0.327E-03	0.902E-03	0.209E-02	0.588E-02	0.112E-01	0.172E-01	0.257E-01
4250	0.225E-03	0.685E-03	0.189E-02	0.512E-02	0.101E-01	0.164E-01	0.236E-01
4275	0.186E-03	0.551E-03	0.166E-02	0.366E-02	0.812E-02	0.136E-01	0.189E-01
4300	0.173E-03	0.472E-03	0.159E-02	0.306E-02	0.661E-02	0.115E-01	0.150E-01
4325	0.138E-03	0.395E-03	0.110E-02	0.272E-02	0.587E-02	0.104E-01	0.126E-01
4350	0.900E-04	0.270E-03	0.968E-03	0.222E-02	0.497E-02	0.921E-02	0.119E-01
4375	0.752E-04	0.237E-03	0.744E-03	0.208E-02	0.466E-02	0.876E-02	0.118E-01
4400	0.618E-04	0.174E-03	0.658E-03	0.185E-02	0.463E-02	0.914E-02	0.124E-01
4425	0.504E-04	0.134E-03	0.499E-03	0.174E-02	0.473E-02	0.943E-02	0.128E-01
4450	0.375E-04	0.123E-03	0.485E-03	0.182E-02	0.483E-02	0.971E-02	0.134E-01
4475	0.305E-04	0.892E-04	0.238E-03	0.134E-02	0.469E-02	0.101E-01	0.142E-01
4500	0.267E-04	0.790E-04	0.329E-03	0.154E-02	0.477E-02	0.112E-01	0.151E-01
4525	0.242E-04	0.779E-04	0.308E-03	0.137E-02	0.475E-02	0.122E-01	0.162E-01
4550	0.213E-04	0.653E-04	0.282E-03	0.131E-02	0.521E-02	0.133E-01	0.174E-01
4575	0.218E-04	0.690E-04	0.272E-03	0.152E-02	0.553E-02	0.148E-01	0.187E-01
4600	0.216E-04	0.671E-04	0.268E-03	0.134E-02	0.607E-02	0.159E-01	0.202E-01
4625	0.217E-04	0.696E-04	0.283E-03	0.161E-02	0.677E-02	0.173E-01	0.223E-01
4650	0.219E-04	0.722E-04	0.297E-03	0.169E-02	0.783E-02	0.197E-01	0.246E-01
4675	0.226E-04	0.771E-04	0.341E-03	0.254E-02	0.923E-02	0.226E-01	0.270E-01
4700	0.250E-04	0.815E-04	0.387E-03	0.286E-02	0.106E-01	0.250E-01	0.300E-01
4725	0.280E-04	0.845E-04	0.429E-03	0.337E-02	0.124E-01	0.276E-01	0.338E-01
4750	0.331E-04	0.102E-03	0.470E-03	0.467E-02	0.163E-01	0.313E-01	0.370E-01
4775	0.435E-04	0.209E-03	0.105E-02	0.566E-02	0.185E-01	0.344E-01	0.399E-01
4800	0.522E-04	0.233E-03	0.129E-02	0.736E-02	0.229E-01	0.378E-01	0.422E-01
4825	0.673E-04	0.306E-03	0.183E-02	0.982E-02	0.258E-01	0.404E-01	0.440E-01
4850	0.886E-04	0.399E-03	0.266E-02	0.128E-01	0.302E-01	0.430E-01	0.484E-01
4875	0.113E-03	0.618E-03	0.366E-02	0.161E-01	0.358E-01	0.459E-01	0.463E-01
4900	0.174E-03	0.825E-03	0.431E-02	0.200E-01	0.417E-01	0.493E-01	0.473E-01
4925	0.265E-03	0.164E-02	0.777E-02	0.245E-01	0.450E-01	0.507E-01	0.478E-01

UNCLASSIFIED

UNCLASSIFIED



4950.	0.355E-03	0.200E-02	0.978E-02	0.317E-01	0.492E-01	0.527E-01	0.478E-01
4975.	0.358E-03	0.271E-02	0.167E-01	0.401E-01	0.503E-01	0.525E-01	0.474E-01
5000.	0.651E-03	0.301E-02	0.264E-01	0.467E-01	0.520E-01	0.529E-01	0.469E-01
5025.	0.987E-03	0.550E-02	0.321E-01	0.499E-01	0.523E-01	0.510E-01	0.447E-01
5050.	0.137E-02	0.860E-02	0.389E-01	0.528E-01	0.513E-01	0.492E-01	0.439E-01
5075.	0.226E-02	0.130E-01	0.472E-01	0.559E-01	0.509E-01	0.469E-01	0.415E-01
5100.	0.431E-02	0.198E-01	0.526E-01	0.557E-01	0.480E-01	0.452E-01	0.400E-01
5125.	0.628E-02	0.282E-01	0.488E-01	0.495E-01	0.451E-01	0.430E-01	0.390E-01
5150.	0.900E-02	0.390E-01	0.471E-01	0.449E-01	0.430E-01	0.423E-01	0.384E-01
5175.	0.180E-01	0.462E-01	0.412E-01	0.391E-01	0.403E-01	0.413E-01	0.393E-01
5200.	0.348E-01	0.710E-01	0.402E-01	0.369E-01	0.384E-01	0.411E-01	0.405E-01
5225.	0.718E-01	0.590E-01	0.399E-01	0.369E-01	0.376E-01	0.426E-01	0.418E-01
5250.	0.111E-00	0.368E-01	0.340E-01	0.369E-01	0.409E-01	0.450E-01	0.434E-01
5275.	0.329E-01	0.285E-01	0.365E-01	0.423E-01	0.461E-01	0.482E-01	0.450E-01
5300.	0.281E-01	0.270E-01	0.432E-01	0.505E-01	0.529E-01	0.511E-01	0.462E-01
5325.	0.121E-00	0.422E-01	0.589E-01	0.584E-01	0.572E-01	0.544E-01	0.479E-01
5350.	0.139E-00	0.105E-00	0.841E-01	0.687E-01	0.763E-01	0.769E-01	0.484E-01
5375.	0.774E-01	0.710E-01	0.684E-01	0.618E-01	0.556E-01	0.535E-01	0.478E-01
5400.	0.858E-01	0.484E-01	0.579E-01	0.547E-01	0.593E-01	0.494E-01	0.469E-01
5425.	0.988E-01	0.575E-01	0.589E-01	0.510E-01	0.451E-01	0.439E-01	0.429E-01
5450.	0.996E-01	0.682E-01	0.539E-01	0.489E-01	0.454E-01	0.446E-01	0.400E-01
5475.	0.680E-01	0.680E-01	0.548E-01	0.495E-01	0.499E-01	0.458E-01	0.465E-01
5500.	0.325E-01	0.520E-01	0.515E-01	0.483E-01	0.449E-01	0.454E-01	0.418E-01
5525.	0.150E-01	0.350E-01	0.451E-01	0.464E-01	0.452E-01	0.449E-01	0.438E-01
5550.	0.620E-02	0.238E-01	0.569E-01	0.408E-01	0.414E-01	0.417E-01	0.420E-01
5575.	0.270E-02	0.138E-01	0.282E-01	0.329E-01	0.366E-01	0.384E-01	0.400E-01
5600.	0.113E-02	0.101E-01	0.203E-01	0.263E-01	0.303E-01	0.337E-01	0.369E-01
5625.	0.829E-03	0.500E-02	0.148E-01	0.206E-01	0.247E-01	0.294E-01	0.320E-01
5650.	0.364E-03	0.310E-02	0.969E-02	0.154E-01	0.203E-01	0.258E-01	0.289E-01
5675.	0.240E-03	0.130E-02	0.559E-02	0.112E-01	0.164E-01	0.222E-01	0.250E-01
5700.	0.158E-03	0.409E-03	0.417E-02	0.850E-02	0.134E-01	0.199E-01	0.220E-01
5725.	0.103E-03	0.262E-03	0.208E-02	0.594E-02	0.109E-01	0.162E-01	0.190E-01
5750.	0.741E-04	0.181E-03	0.142E-02	0.435E-02	0.907E-02	0.144E-01	0.170E-01
5775.	0.623E-04	0.135E-03	0.816E-03	0.316E-02	0.698E-02	0.121E-01	0.150E-01
5800.	0.499E-04	0.111E-03	0.624E-03	0.230E-02	0.551E-02	0.102E-01	0.130E-01
5825.	0.325E-04	0.677E-04	0.425E-03	0.124E-02	0.385E-02	0.818E-02	0.120E-01
5850.	0.231E-04	0.363E-04	0.278E-03	0.986E-03	0.290E-02	0.672E-02	0.105E-01
5875.	0.165E-04	0.481E-04	0.247E-03	0.944E-03	0.253E-02	0.612E-02	0.980E-02
5900.	0.126E-04	0.432E-04	0.241E-03	0.886E-03	0.220E-02	0.582E-02	0.540E-02
5925.	0.118E-04	0.420E-04	0.235E-03	0.847E-03	0.209E-02	0.571E-02	0.530E-02
5950.	0.110E-04	0.408E-04	0.226E-03	0.812E-03	0.221E-02	0.604E-02	0.925E-02
5975.	0.101E-04	0.400E-04	0.213E-03	0.805E-03	0.229E-02	0.641E-02	0.930E-02
6000.	0.983E-05	0.393E-04	0.186E-03	0.801E-03	0.247E-02	0.691E-02	0.950E-02
6025.	0.979E-05	0.401E-04	0.193E-03	0.895E-03	0.260E-02	0.732E-02	0.970E-02
6050.	0.976E-05	0.410E-04	0.201E-03	0.814E-03	0.285E-02	0.776E-02	0.100E-01
6075.	0.988E-05	0.420E-04	0.210E-03	0.832E-03	0.317E-02	0.842E-02	0.103E-01
6100.	0.991E-05	0.425E-04	0.219E-03	0.877E-03	0.340E-02	0.888E-02	0.135E-01
6125.	0.192E-04	0.455E-04	0.231E-03	0.937E-03	0.364E-02	0.925E-02	0.119E-01
6150.	0.110E-04	0.486E-04	0.244E-03	0.974E-03	0.402E-02	0.994E-02	0.115E-01
6175.	0.127E-04	0.579E-04	0.252E-03	0.114E-02	0.437E-02	0.104E-01	0.119E-01
6200.	0.131E-04	0.612E-04	0.275E-03	0.115E-02	0.465E-02	0.110E-01	0.127E-01
6225.	0.154E-04	0.784E-04	0.352E-03	0.119E-02	0.510E-02	0.116E-01	0.151E-01
6250.	0.178E-04	0.922E-04	0.394E-03	0.157E-02	0.557E-02	0.127E-01	0.173E-01
6275.	0.203E-04	0.115E-03	0.481E-03	0.188E-02	0.609E-02	0.151E-01	0.195E-01
6300.	0.230E-04	0.145E-03	0.617E-03	0.188E-02	0.644E-02	0.139E-01	0.150E-01
6325.	0.280E-04	0.187E-03	0.729E-03	0.202E-02	0.686E-02	0.146E-01	0.157E-01
6350.	0.303E-04	0.209E-03	0.811E-03	0.219E-02	0.779E-02	0.157E-01	0.164E-01
6375.	0.453E-04	0.244E-03	0.935E-03	0.243E-02	0.844E-02	0.166E-01	0.172E-01
6400.	0.661E-04	0.329E-03	0.286E-03	0.288E-02	0.902E-02	0.173E-01	0.180E-01
6425.	0.724E-04	0.397E-03	0.424E-02	0.359E-02	0.106E-01	0.184E-01	0.191E-01
6450.	0.847E-04	0.481E-03	0.514E-02	0.454E-02	0.108E-01	0.192E-01	0.200E-01
6475.	0.103E-03	0.591E-03	0.174E-02	0.488E-02	0.116E-01	0.209E-01	0.211E-01
6500.	0.133E-03	0.763E-03	0.247E-02	0.514E-02	0.124E-01	0.204E-01	0.222E-01
6525.	0.165E-03	0.852E-03	0.267E-02	0.641E-02	0.151E-01	0.219E-01	0.235E-01
6550.	0.207E-03	0.110E-02	0.298E-02	0.742E-02	0.166E-01	0.218E-01	0.241E-01
6575.	0.254E-04	0.180E-02	0.346E-02	0.814E-02	0.179E-01	0.230E-01	0.254E-01
6600.	0.318E-03	0.150E-02	0.445E-02	0.899E-02	0.199E-01	0.235E-01	0.267E-01

UNCLASSIFIED

UNCLASSIFIED



6655	0.437E-03	0.179E-02	0.490E-02	0.107E-01	0.179E-01	0.245E-01	0.276E-01
6656	0.581E-03	0.190E-02	0.557E-02	0.116E-01	0.179E-01	0.274E-01	0.287E-01
6657	0.684E-03	0.220E-02	0.558E-02	0.128E-01	0.189E-01	0.263E-01	0.296E-01
6658	0.900E-03	0.250E-02	0.609E-02	0.134E-01	0.195E-01	0.275E-01	0.305E-01
6659	0.121E-02	0.280E-02	0.722E-02	0.142E-01	0.202E-01	0.285E-01	0.313E-01
6660	0.152E-02	0.320E-02	0.813E-02	0.161E-01	0.212E-01	0.288E-01	0.320E-01
6675	0.185E-02	0.370E-02	0.967E-02	0.168E-01	0.222E-01	0.292E-01	0.329E-01
6800	0.220E-02	0.430E-02	0.929E-02	0.183E-01	0.233E-01	0.294E-01	0.335E-01
6825	0.255E-02	0.500E-02	0.114E-01	0.193E-01	0.243E-01	0.289E-01	0.339E-01
6830	0.290E-02	0.580E-02	0.167E-01	0.215E-01	0.269E-01	0.291E-01	0.343E-01
6875	0.320E-02	0.670E-02	0.208E-01	0.237E-01	0.274E-01	0.293E-01	0.347E-01
6900	0.360E-02	0.880E-02	0.220E-01	0.253E-01	0.282E-01	0.300E-01	0.349E-01
6925	0.400E-02	0.920E-02	0.258E-01	0.273E-01	0.296E-01	0.304E-01	0.349E-01
6950	0.460E-02	0.108E-01	0.272E-01	0.270E-01	0.298E-01	0.310E-01	0.349E-01
6975	0.530E-02	0.128E-01	0.304E-01	0.292E-01	0.297E-01	0.312E-01	0.349E-01
7000	0.620E-02	0.132E-01	0.344E-01	0.303E-01	0.293E-01	0.316E-01	0.349E-01
7025	0.760E-02	0.182E-01	0.341E-01	0.297E-01	0.296E-01	0.300E-01	0.343E-01
7050	0.980E-02	0.222E-01	0.381E-01	0.318E-01	0.291E-01	0.291E-01	0.296E-01
7075	0.132E-01	0.271E-01	0.402E-01	0.291E-01	0.274E-01	0.282E-01	0.283E-01
7100	0.190E-01	0.345E-01	0.421E-01	0.286E-01	0.262E-01	0.269E-01	0.253E-01
7125	0.240E-01	0.432E-01	0.431E-01	0.276E-01	0.245E-01	0.257E-01	0.243E-01
7150	0.288E-01	0.570E-01	0.458E-01	0.270E-01	0.228E-01	0.243E-01	0.223E-01
7175	0.323E-01	0.740E-01	0.449E-01	0.261E-01	0.214E-01	0.221E-01	0.208E-01
7200	0.570E-01	0.890E-01	0.435E-01	0.235E-01	0.199E-01	0.196E-01	0.199E-01
7225	0.216E-01	0.680E-01	0.378E-01	0.239E-01	0.193E-01	0.192E-01	0.190E-01
7250	0.126E-01	0.473E-01	0.364E-01	0.238E-01	0.197E-01	0.192E-01	0.187E-01
7275	0.117E-01	0.369E-01	0.383E-01	0.249E-01	0.212E-01	0.204E-01	0.200E-01
7300	0.140E-01	0.370E-01	0.419E-01	0.272E-01	0.228E-01	0.213E-01	0.224E-01
7325	0.425E-01	0.418E-01	0.440E-01	0.280E-01	0.248E-01	0.220E-01	0.243E-01
7350	0.640E-01	0.460E-01	0.427E-01	0.290E-01	0.263E-01	0.278E-01	0.260E-01
7375	0.385E-01	0.385E-01	0.374E-01	0.259E-01	0.235E-01	0.221E-01	0.260E-01
7400	0.182E-01	0.179E-01	0.282E-01	0.231E-01	0.211E-01	0.214E-01	0.240E-01
7425	0.170E-01	0.810E-02	0.191E-01	0.175E-01	0.181E-01	0.194E-01	0.210E-01
7450	0.161E-01	0.370E-02	0.103E-01	0.127E-01	0.172E-01	0.171E-01	0.180E-01
7475	0.145E-01	0.170E-02	0.554E-02	0.835E-02	0.113E-01	0.131E-01	0.130E-01
7500	0.175E-02	0.140E-02	0.383E-02	0.595E-02	0.803E-02	0.945E-02	0.120E-01
7525	0.772E-03	0.741E-03	0.384E-02	0.575E-02	0.537E-02	0.591E-02	0.890E-02
7550	0.491E-03	0.609E-03	0.301E-02	0.453E-02	0.380E-02	0.434E-02	0.690E-02
7575	0.275E-03	0.410E-03	0.193E-02	0.366E-02	0.319E-02	0.332E-02	0.504E-02
7600	0.185E-03	0.280E-03	0.131E-02	0.232E-02	0.247E-02	0.256E-02	0.429E-02
7625	0.101E-03	0.160E-03	0.915E-03	0.150E-02	0.186E-02	0.197E-02	0.370E-02
7650	0.694E-04	0.110E-03	0.565E-03	0.114E-02	0.203E-02	0.192E-02	0.340E-02
7675	0.476E-04	0.750E-04	0.114E-02	0.124E-02	0.175E-02	0.187E-02	0.320E-02
7700	0.305E-04	0.290E-04	0.529E-03	0.114E-02	0.160E-02	0.185E-02	0.300E-02
7725	0.240E-04	0.480E-04	0.293E-03	0.842E-03	0.141E-02	0.184E-02	0.299E-02
7750	0.176E-04	0.360E-04	0.122E-03	0.437E-03	0.124E-02	0.182E-02	0.294E-02
7775	0.129E-04	0.240E-04	0.121E-03	0.437E-03	0.118E-02	0.187E-02	0.294E-02
7800	0.840E-05	0.170E-04	0.164E-03	0.430E-03	0.120E-02	0.192E-02	0.294E-02
7825	0.563E-05	0.120E-04	0.806E-04	0.367E-03	0.119E-02	0.193E-02	0.304E-02
7850	0.296E-05	0.090E-04	0.719E-04	0.344E-03	0.130E-02	0.194E-02	0.304E-02
7875	0.296E-05	0.840E-05	0.374E-04	0.251E-03	0.119E-02	0.193E-02	0.304E-02
7900	0.260E-05	0.890E-05	0.403E-04	0.298E-03	0.117E-02	0.201E-02	0.324E-02
7925	0.225E-05	0.820E-05	0.367E-04	0.252E-03	0.116E-02	0.203E-02	0.320E-02
7950	0.226E-05	0.840E-05	0.371E-04	0.268E-03	0.127E-02	0.211E-02	0.340E-02
7975	0.223E-05	0.920E-05	0.396E-04	0.273E-03	0.128E-02	0.216E-02	0.353E-02
8000	0.235E-05	0.103E-04	0.415E-04	0.267E-03	0.121E-02	0.221E-02	0.363E-02
8025	0.280E-05	0.125E-04	0.643E-04	0.363E-03	0.136E-02	0.234E-02	0.380E-02
8050	0.310E-05	0.150E-04	0.979E-04	0.492E-03	0.139E-02	0.241E-02	0.404E-02
8075	0.370E-05	0.180E-04	0.124E-03	0.580E-03	0.167E-02	0.251E-02	0.410E-02
8100	0.420E-05	0.200E-04	0.682E-04	0.599E-03	0.174E-02	0.257E-02	0.420E-02
8125	0.510E-05	0.240E-04	0.144E-03	0.347E-03	0.173E-02	0.267E-02	0.440E-02
8150	0.690E-05	0.270E-04	0.121E-03	0.544E-03	0.172E-02	0.274E-02	0.457E-02
8175	0.720E-05	0.300E-04	0.204E-03	0.684E-03	0.184E-02	0.284E-02	0.468E-02
8200	0.820E-05	0.320E-04	0.276E-03	0.849E-03	0.193E-02	0.297E-02	0.479E-02
8225	0.100E-04	0.380E-04	0.417E-03	0.899E-03	0.214E-02	0.308E-02	0.484E-02
8250	0.123E-04	0.430E-04	0.240E-03	0.818E-03	0.220E-02	0.317E-02	0.490E-02
8275	0.143E-04	0.500E-04	0.152E-03	0.499E-03	0.238E-02	0.293E-02	0.434E-02

UNCLASSIFIED



8890	0.173E-01	0.560E-04	0.391E-03	0.941E-03	0.213E-02	0.342E-02	0.560E-02
8891	0.198E-01	0.630E-04	0.280E-03	0.107E-02	0.260E-02	0.334E-02	0.501E-02
8892	0.230E-01	0.710E-04	0.276E-03	0.109E-02	0.272E-02	0.363E-02	0.502E-02
8893	0.280E-01	0.830E-04	0.409E-03	0.127E-02	0.293E-02	0.377E-02	0.501E-02
8894	0.330E-01	0.900E-04	0.430E-03	0.129E-02	0.306E-02	0.385E-02	0.500E-02
8895	0.360E-01	0.950E-04	0.371E-03	0.134E-02	0.306E-02	0.384E-02	0.499E-02
8896	0.390E-01	0.980E-04	0.434E-03	0.147E-02	0.316E-02	0.384E-02	0.495E-02
8897	0.400E-01	0.990E-04	0.397E-03	0.143E-02	0.318E-02	0.384E-02	0.490E-02
8898	0.400E-01	0.980E-04	0.361E-03	0.141E-02	0.317E-02	0.384E-02	0.480E-02
8899	0.400E-01	0.980E-04	0.390E-03	0.142E-02	0.311E-02	0.376E-02	0.473E-02
8900	0.390E-01	0.910E-04	0.380E-03	0.145E-02	0.318E-02	0.373E-02	0.469E-02
8901	0.380E-01	0.900E-04	0.358E-03	0.138E-02	0.310E-02	0.372E-02	0.455E-02
8902	0.380E-01	0.880E-04	0.343E-03	0.136E-02	0.309E-02	0.369E-02	0.444E-02
8903	0.370E-01	0.880E-04	0.382E-03	0.143E-02	0.317E-02	0.369E-02	0.433E-02
8904	0.270E-01	0.580E-04	0.343E-03	0.136E-02	0.303E-02	0.363E-02	0.429E-02
8905	0.260E-01	0.450E-04	0.309E-03	0.131E-02	0.296E-02	0.359E-02	0.408E-02
8906	0.180E-01	0.400E-04	0.281E-03	0.127E-02	0.294E-02	0.341E-02	0.393E-02
8907	0.170E-01	0.360E-04	0.276E-03	0.124E-02	0.290E-02	0.336E-02	0.380E-02
8908	0.160E-01	0.310E-04	0.272E-03	0.122E-02	0.283E-02	0.323E-02	0.367E-02
8909	0.140E-01	0.280E-04	0.241E-03	0.117E-02	0.273E-02	0.309E-02	0.351E-02
8910	0.120E-01	0.250E-04	0.237E-03	0.115E-02	0.269E-02	0.297E-02	0.338E-02
8911	0.100E-01	0.220E-04	0.218E-03	0.111E-02	0.259E-02	0.284E-02	0.323E-02
8912	0.090E-01	0.198E-04	0.206E-03	0.105E-02	0.246E-02	0.269E-02	0.310E-02
8913	0.080E-01	0.170E-04	0.205E-03	0.100E-02	0.235E-02	0.257E-02	0.295E-02
8914	0.070E-01	0.160E-04	0.177E-03	0.092E-02	0.220E-02	0.245E-02	0.280E-02
8915	0.060E-01	0.130E-04	0.172E-03	0.084E-02	0.205E-02	0.232E-02	0.265E-02
8916	0.050E-01	0.130E-04	0.147E-03	0.073E-02	0.194E-02	0.218E-02	0.250E-02
8917	0.040E-01	0.110E-04	0.129E-03	0.062E-02	0.177E-02	0.203E-02	0.240E-02
8918	0.030E-01	0.0950E-03	0.0609E-04	0.0513E-03	0.154E-02	0.180E-02	0.238E-02
8919	0.020E-01	0.0800E-03	0.0578E-04	0.0444E-03	0.123E-02	0.154E-02	0.218E-02
8920	0.010E-01	0.0720E-03	0.0529E-04	0.0292E-03	0.114E-02	0.137E-02	0.207E-02
8921	0.000E-01	0.0660E-03	0.0485E-04	0.0269E-03	0.102E-02	0.122E-02	0.197E-02
8922	0.000E-01	0.0580E-03	0.0430E-04	0.0229E-03	0.096E-03	0.107E-02	0.187E-02
8923	0.000E-01	0.0520E-03	0.0393E-04	0.0193E-03	0.0784E-03	0.0944E-03	0.179E-02
8924	0.000E-01	0.0450E-03	0.0316E-04	0.0207E-03	0.071E-03	0.0848E-03	0.171E-02
8925	0.000E-01	0.0400E-03	0.0444E-05	0.0602E-04	0.0516E-03	0.0730E-03	0.160E-02
8926	0.000E-01	0.0360E-03	0.0324E-05	0.0469E-04	0.0439E-03	0.0688E-03	0.156E-02
8927	0.000E-01	0.0320E-03	0.0180E-05	0.0321E-04	0.0384E-04	0.0633E-03	0.149E-02
8928	0.000E-01	0.0280E-03	0.0171E-05	0.0344E-04	0.0340E-04	0.0616E-03	0.143E-02
8929	0.000E-01	0.0250E-03	0.0296E-05	0.0600E-04	0.0433E-04	0.0619E-03	0.138E-02
8930	0.000E-01	0.0220E-03	0.0296E-05	0.0600E-04	0.0433E-04	0.0619E-03	0.133E-02

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APPENDIX F

Carbon Dioxide emission data for the range 3000-3770 cm^{-1} .

This appendix presents the carbon dioxide emission data as given in the report:

Ludwig, C.R., "Tables of Carbon Dioxide Absorption Coefficients" as obtained in private conversations with Dr. Ludwig when he was at General Dynamics.

The data is given in tabular form as a function of temperature and wavenumber. The equations utilizing these numbers are given in Section 3.2.

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ABSORPTION COEFFICIENTS OF CO₂

K (PER CM AT STP)

2.7 MICRON COMBINATION BAND

1/CM MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K	3000 K
3000	-0.	-0.	-0.	-0.	-0.	-0.	1.166-02
3010	-0.	-0.	-0.	-0.	-0.	-0.	1.270-02
3020	-0.	-0.	-0.	-0.	-0.	-0.	1.373-02
3030	-0.	-0.	-0.	-0.	-0.	-0.	1.567-02
3040	-0.	-0.	-0.	-0.	-0.	-0.	1.761-02
3050	-0.	-0.	-0.	-0.	-0.	-0.	2.032-02
3060	-0.	-0.	-0.	-0.	-0.	-0.	2.303-02
3070	-0.	-0.	-0.	-0.	-0.	-0.	2.489-02
3080	-0.	-0.	-0.	-0.	-0.	-0.	2.675-02
3090	-0.	-0.	-0.	-0.	-0.	3.399-03	3.016-02
3100	-0.	-0.	-0.	-0.	-0.	6.798-03	3.356-02
3110	-0.	-0.	2.145-10-0.	-0.	-0.	8.290-03	3.803-02
3120	-0.	-0.	4.290-10-0.	-0.	-0.	9.762-03	4.250-02
3130	-0.	-0.	1.516-09-0.	-0.	-0.	1.131-02	4.590-02
3140	-0.	-0.	2.602-09-0.	-0.	-0.	1.324-02	4.929-02
3150	-0.	-0.	8.828-09-0.	-0.	-0.	1.565-02	5.510-02
3160	-0.	-0.	1.505-08	1.361-05	5.917-04	1.806-02	6.091-02
3170	-0.	-0.	4.983-08	2.723-05	1.163-03	2.132-02	6.984-02
3180	-0.	-0.	8.260-08	4.842-05	1.661-03	2.459-02	7.878-02
3190	-0.	-0.	2.548-07	8.452-05	2.267-03	2.755-02	8.107-02
3200	-0.	-0.	4.271-07	1.446-04	3.003-03	3.052-02	8.336-02
3210	-0.	3.505-20	1.246-06	2.419-04	3.853-03	3.505-02	9.171-02
3220	-0.	7.010-20	2.064-06	3.953-04	4.785-03	3.958-02	1.001-01
3230	-0.	1.554-18	4.412-06	6.295-04	6.050-03	4.569-02	1.124-01
3240	-0.	3.038-18	9.237-06	9.745-04	7.677-03	5.179-02	1.248-01
3250	-0.	6.243-17	1.691-05	1.463-03	9.785-03	5.728-02	1.276-01

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)
K (PER CM AT STP)

2.7 MICRON COMBINATION BAND

1/CM MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K	3000 K
3260	3.07	-0.	1.218-16	3.780-05	2.125-03	1.225-02	6.296-02
3270	3.06	-0.	2.302-15	7.361-05	2.931-03	1.519-02	7.520-02
3280	3.05	-0.	4.483-15	1.394-04	4.030-03	1.821-02	7.927-02
3290	3.04	-0.	7.724-14	2.558-04	5.252-03	2.155-02	8.682-02
3300	3.03	1.100-32	2.200-32	1.500-13	4.542-04	6.917-03	2.639-02
3310	3.02	8.768-31	2.331-12	7.774-04	9.072-03	3.111-02	1.071-01
3320	3.01	3.397-29	4.512-12	1.279-03	1.193-02	3.726-02	1.173-01
3330	3.00	1.243-27	2.368-11	2.017-03	1.532-02	4.403-02	1.334-01
3340	2.99	4.340-26	1.204-10	3.041-03	1.942-02	5.182-02	1.425-01
3350	2.99	1.442-24	5.914-10	4.378-03	2.412-02	5.985-02	1.493-01
3360	2.98	4.549-23	2.802-09	6.029-03	2.986-02	7.100-02	1.785-01
3370	2.97	1.358-21	1.276-08	5.331-03	3.688-02	8.066-02	1.763-01
3380	2.96	3.819-20	5.572-08	1.155-02	4.466-02	9.186-02	1.851-01
3390	2.95	1.009-18	2.324-07	1.536-02	5.462-02	1.064-01	2.063-01
3400	2.94	2.493-17	9.225-07	2.104-02	6.493-02	1.185-01	2.116-01
3410	2.93	5.730-16	3.470-06	2.806-02	7.862-02	1.354-01	2.256-01
3420	2.92	1.219-14	1.230-05	3.617-02	9.178-02	1.511-01	2.471-01
3430	2.92	2.385-13	4.091-05	4.683-02	1.090-01	1.631-01	2.516-01
3440	2.91	4.262-12	1.267-04	5.915-02	1.294-01	1.812-01	2.463-01
3450	2.90	6.900-11	3.632-04	7.424-02	1.433-01	2.032-01	3.020-01
3460	2.89	1.003-09	9.265-04	9.206-02	1.840-01	2.143-01	2.694-01
3470	2.88	1.295-08	2.299-03	1.112-01	1.816-01	2.242-01	2.532-01
3480	2.87	1.467-07	5.017-03	1.331-01	2.038-01	2.442-01	2.928-01
3490	2.87	5.300-04	9.936-03	1.548-01	2.169-01	2.469-01	2.819-01
3500	2.86	1.198-05	1.799-02	1.857-01	2.422-01	2.664-01	2.988-01
3510	2.85	8.339-05	3.103-02	2.054-01	2.477-01	2.693-01	3.137-01
3520	2.84	4.747-04	5.290-02	2.310-01	2.652-01	2.772-01	3.192-01
3530	2.83	2.162-03	8.412-02	2.483-01	2.685-01	2.693-01	3.000-01
3540	2.82	4.889-02	1.228-01	2.656-01	2.692-01	3.033-01	4.000-01

F-3

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)

K (PER CM AT STP)

2.7 MICRON COMBINATION BAND

1/CM	MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K	3000 K
3550	2.82	2.125-02	1.684-01	2.763-01	2.818-01	2.837-01	3.358-01	4.173-01
3560	2.81	4.482-02	1.912-01	2.544-01	2.566-01	2.643-01	3.353-01	4.292-01
3565	2.81	6.359-02	2.163-01	2.611-01	2.622-01	2.740-01	3.508-01	4.436-01
3570	2.80	8.610-02	2.537-01	2.679-01	2.677-01	2.836-01	3.662-01	4.580-01
3575	2.80	1.106-01	2.716-01	2.631-01	2.632-01	2.809-01	3.684-01	4.608-01
3580	2.79	1.465-01	2.648-01	2.583-01	2.587-01	2.782-01	3.705-01	4.636-01
3585	2.79	2.826-01	3.578-01	2.784-01	2.774-01	3.004-01	3.965-01	4.822-01
3590	2.79	4.404-01	4.261-01	2.986-01	2.961-01	3.226-01	4.225-01	5.008-01
3595	2.78	5.782-01	4.560-01	2.903-01	2.956-01	3.264-01	4.277-01	5.029-01
3600	2.78	6.342-01	4.255-01	2.821-01	2.952-01	3.301-01	4.330-01	5.050-01
3605	2.77	5.391-01	3.292-01	2.413-01	2.798-01	3.345-01	4.521-01	5.216-01
3610	2.77	2.525-01	1.740-01	2.004-01	2.643-01	3.390-01	4.712-01	5.383-01
3615	2.77	1.824-01	1.063-01	1.959-01	2.641-01	3.383-01	4.662-01	5.337-01
3620	2.76	6.008-01	2.321-01	1.911-01	2.638-01	3.377-01	4.613-01	5.290-01
3625	2.76	8.115-01	3.494-01	2.163-01	2.797-01	3.706-01	4.948-01	5.549-01
3630	2.75	7.264-01	4.134-01	2.415-01	2.957-01	4.035-01	5.283-01	5.807-01
3635	2.75	4.525-01	3.977-01	2.752-01	3.366-01	4.180-01	5.218-01	5.683-01
3640	2.75	1.890-01	3.130-01	3.089-01	3.776-01	4.325-01	5.154-01	5.558-01
3645	2.74	4.820-02	2.013-01	3.248-01	4.019-01	4.536-01	5.254-01	5.600-01
3650	2.74	7.095-03	1.127-01	3.407-01	4.261-01	4.746-01	5.354-01	5.642-01
3655	2.74	3.107-03	7.624-02	1.877-01	4.323-01	4.803-01	5.375-01	5.646-01
3660	2.73	7.331-03	8.834-02	3.471-02	4.585-01	4.859-01	5.397-01	5.651-01
3665	2.73	1.776-02	1.290-01	2.197-01	4.495-01	4.841-01	5.302-01	5.555-01
3670	2.72	4.043-02	1.891-01	4.046-01	4.605-01	4.822-01	5.207-01	5.459-01
3675	2.72	8.591-02	2.671-01	4.344-01	4.921-01	5.005-01	5.277-01	5.468-01
3680	2.72	1.691-01	3.634-01	5.042-01	5.239-01	5.187-01	5.346-01	5.477-01
3685	2.71	3.051-01	4.691-01	5.254-01	5.303-01	5.214-01	5.388-01	5.485-01
3690	2.71	4.982-01	5.696-01	5.465-01	5.368-01	5.241-01	5.429-01	5.493-01
3695	2.71	7.218-01	6.423-01	5.125-01	5.045-01	5.032-01	5.340-01	5.376-01

F-4

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ABSORPTION COEFFICIENTS OF CO ₂ (CONT'D)									
K (PER CM AT STP)									
2.7 MICRON COMBINATION BAND									
1/CM MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K	3000 K		
3700	2.70	8.999-01	6.584-01	4.736-01	4.722-01	4.822-01	5.252-01	5.259-01	
3705	2.70	9.102-01	5.888-01	4.041-01	4.234-01	4.554-01	5.101-01	5.038-01	
3710	2.70	6.353-01	4.169-01	3.296-01	3.746-01	4.286-01	4.950-01	4.817-01	
3715	2.69	6.328-02	1.545-01	3.313-01	3.832-01	4.337-01	4.800-01	4.497-01	
3720	2.69	6.949-01	3.365-01	3.330-01	3.918-01	4.388-01	4.649-01	4.177-01	
3725	2.68	1.159+00	5.998-01	4.776-01	4.953-01	4.942-01	4.603-01	3.845-01	
3730	2.68	1.256+00	8.751-01	6.222-01	5.988-01	5.496-01	4.557-01	3.513-01	
3735	2.68	9.516-01	9.045-01	5.938-01	6.468-01	5.735-01	4.482-01	3.315-01	
3740	2.67	5.092-01	9.013-01	7.695-01	6.947-01	5.973-01	4.407-01	3.118-01	
3745	2.67	1.869-01	6.716-01	6.933-01	6.351-01	5.457-01	3.929-01	2.709-01	
3750	2.67	4.535-02	3.965-01	6.171-01	5.755-01	4.942-01	3.450-01	2.300-01	
3755	2.66	7.247-03	1.762-01	4.440-01	4.339-01	3.840-01	2.709-01	1.793-01	
3760	2.66	7.296-04	5.455-02	2.708-01	2.923-01	2.738-01	1.967-01	1.285-01	
3765	2.66	2.915-05	1.045-02	1.505-01	1.667-01	1.594-01	1.168-01	7.680-02	
3770	2.65	1.079-07	6.896-04	3.010-02	4.100-02	4.508-02	3.681-02	2.507-02	

F-5

UNCLASSIFIED

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ABSORPTION COEFFICIENTS OF CO₂
SQRT(4 X ALPHA X S/DXD) AT STP
2.7 MICROM COMBINATION BAND

1/CM MICRON	300 K	600 K	1200 K
3000 3.33	.0000E 00	.0000E 00	.0000E 00
3210 3.11	.0000E 00	.0000E 00	.0000E 00
3020 3.31	.0000E 00	.0000E 00	.0000E 00
3030 3.30	.0000E 00	.0000E 00	.0000E 00
3040 3.28	.0000E 00	.0000E 00	.0000E 00
3050 3.27	.0000E 00	.0000E 00	.0000E 00
3060 3.26	.0000E 00	.0000E 00	.0000E 00
3070 3.25	.0000E 00	.0000E 00	.0000E 00
3080 3.24	.0000E 00	.0000E 00	.0000E 00
3090 3.23	.0000E 00	.0000E 00	.0000E 00
3100 3.22	.0000E 00	.0000E 00	.0000E 00
3110 3.21	.0000E 00	.0000E 00	.0000E 00
3120 3.20	.0000E 00	.0000E 00	.7891E-04
3130 3.19	.0000E 00	.0000E 00	.0000E 00
3140 3.18	.0000E 00	.0000E 00	.1704E-03
3150 3.17	.0000E 00	.0000E 00	.0000E 00
3160 3.16	.0000E 00	.0000E 00	.4161E-03
3170 3.15	.0000E 00	.0000E 00	.0000E 00
3180 3.14	.0000E 00	.0000E 00	.9944E-03
3190 3.13	.0000E 00	.0000E 00	.0000E 00
3200 3.12	.0000E 00	.0000E 00	.2316E-02
3210 3.11	.0000E 00	.0000E 00	.0000E 00
3220 3.10	.0000E 00	.3049E-09	.5251E-02
3230 3.09	.0000E 00	.0000E 00	.7813E-02
3240 3.08	.0000E 00	.2014E-08	.1152E-01
3250 3.07	.0000E 00	.0000E 00	.1684E-01

F-6

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)
 SORT(4 X ALPHA X S/DXD) AT STP
 2.7 MICROM COMBINATION BAND

1/CM	MICRON	300 K	600 K	1200 K
3260	3.06	.0000E 00	.1284E-07	.2436E-01
3270	3.05	.0000E 00	.0000E 00	.3486E-01
3280	3.04	.0000E 00	.7872E-07	.4929E-01
3290	3.03	.0000E 00	.0000E 00	.6876E-01
3300	3.03	.8047E-16	.4619E-06	.9451E-01
3310	3.02	.5090E-15	.0000E 00	.1277E 00
3320	3.01	.3433E-14	.2582E-05	.1695E 00
3330	3.00	.2087E-13	.5983E-05	.2199E 00
3340	2.99	.1241E-12	.1366E-04	.2782E 00
3350	2.98	.7205E-12	.3073E-04	.3402E 00
3360	2.97	.4077E-11	.6797E-04	.3958E 00
3370	2.96	.2247E-09	.1476E-03	.4635E 00
3380	2.95	.1203E-09	.3147E-03	.5587E 00
3390	2.94	.6255E-09	.5677E-03	.6713E 00
3400	2.94	.3146E-08	.1340E-02	.7621E 00
3410	2.93	.1529E-07	.2669E-02	.8577E 00
3420	2.92	.7163E-07	.5173E-02	.9407E 00
3430	2.91	.3222E-06	.9734E-02	.1014E 01
3440	2.90	.1387E-05	.1771E-01	.1075E 01
3450	2.89	.5704E-05	.3107E-01	.1127E 01
3460	2.89	.2225E-04	.5224E-01	.1194E 01
3470	2.88	.8209E-04	.8376E-01	.1223E 01
3480	2.87	.2842E-03	.1269E 00	.1290E 01
3490	2.86	.9185E-03	.1799E 00	.1156E 01
3500	2.85	.2744E-02	.2336E 00	.1353E 01
3510	2.84	.7506E-01	.2795E 00	.1241E 01
3520	2.84	.1556E-01	.3713E 00	.1372E 01
3530	2.83	.4065E-01	.4481E 00	.1259E 01
3540	2.82	.7832E-01	.5187E 00	.1172E 01
3550	2.81	.1269E 00	.5664E 00	.1245E 01

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)
SQRT(4 X ALPHA X S/DXD) AT STP
2.7 MICROM COMBINATION BAND

1/CM MICRON	300 K	600 K	1200 K
3560 2.80	.1592E 00	.5269E 00	.1112E 01
3570 2.80	.2451E 00	.5760E 00	.1204E 01
3580 2.79	.2006E 00	.4613E 00	.1085E 01
3590 2.78	.4137E 00	.5829E 00	.1305E 01
3600 2.77	.4418E 00	.5179E 00	.1242E 01
3610 2.77	.2590E 00	.3129E 00	.1155E 01
3620 2.76	.3368E 00	.2979E 00	.1337E 01
3630 2.75	.3879E 00	.3261E 00	.1453E 01
3640 2.74	.2176E 00	.3666E 00	.1707E 01
3650 2.73	.5555E 00	.3489E 00	.1893E 01
3660 2.73	.3783E 00	.3498E 00	.1994E 01
3670 2.72	.9134E 00	.4542E 00	.2065E 01
3680 2.71	.1962E 00	.6502E 00	.2222E 01
3090 3.23	.3579E 00	.8247E 00	.2293E 01
3700 2.70	.5211E 00	.8619E 00	.2274E 01
3710 2.69	.5040E 00	.7022E 00	.2098E 01
3720 2.68	.4783E 00	.7191E 00	.1982E 01
3730 2.68	.7315E 00	.1131E 01	.2253E 01
3740 2.67	.5637E 00	.1171E 01	.2065E 01
3750 2.66	.2065E 00	.7947E 00	.1275E 01
3760 2.65	.2379E-01	.2849E 00	.1266E 01
3770 2.65	.1658E-03	.2403E-01	.1586E 00

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APPENDIX G

Carbon Dioxide Emission data for the range 2050-2500 cm^{-1} .

This appendix presents the Carbon Dioxide emission data as given in the report:

Jackson, H., Tracey, "A Model for the Spectral Emission of Carbon Dioxide in the 4.3μ Band". Report No. RE-TR-69-9 April 1968. U.S. Army Missile Command, Redstone Arsenal, Alabama.

The data is given in tabular form as a function of temperature and wavenumber. The equations utilizing these numbers are given in Section 3.3

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The Spectral Band Parameter S/d as a Function of Temperature

AC02

WAVE NUMBER (1/CM)	TEMPERATURE (DEGREES KELVIN)						
	300.	600.	900.	1200.	1500.	1800.	2100.
2050.	2.60E-03	4.80E-04	3.40E-04	4.10E-04	8.20E-04	5.70E-03	2.60E-02
2055.	4.80E-03	7.00E-04	4.50E-04	5.20E-04	1.08E-03	7.20E-03	3.00E-02
2060.	8.01E-03	1.03E-03	5.72E-04	6.37E-04	1.37E-03	9.08E-03	3.56E-02
2065.	1.40E-02	1.51E-03	7.53E-04	8.23E-04	1.77E-03	1.14E-02	4.12E-02
2070.	1.87E-02	1.89E-03	9.57E-04	1.06E-03	2.28E-03	1.42E-02	4.76E-02
2075.	2.02E-02	2.08E-03	1.15E-03	1.34E-03	2.95E-03	1.75E-02	5.47E-02
2080.	1.65E-02	1.99E-03	1.30E-03	1.66E-03	3.81E-03	2.13E-02	6.28E-02
2085.	1.08E-02	1.79E-03	1.44E-03	2.04E-03	4.96E-03	2.58E-02	7.21E-02
2090.	6.31E-03	1.63E-03	1.57E-03	2.54E-03	6.41E-03	3.08E-02	8.30E-02
2095.	3.21E-03	1.52E-03	1.77E-03	2.81E-03	8.23E-03	3.65E-02	9.51E-02
2100.	1.81E-03	1.47E-03	2.10E-03	2.65E-03	1.06E-02	4.28E-02	1.08E-01
2105.	1.33E-03	1.41E-03	2.35E-03	2.30E-03	1.36E-02	5.01E-02	1.24E-01
2110.	9.55E-04	1.26E-03	2.32E-03	1.89E-03	1.73E-02	5.86E-02	1.41E-01
2115.	6.95E-04	1.07E-03	2.08E-03	1.86E-03	2.21E-02	6.86E-02	1.60E-01
2120.	5.65E-04	8.82E-04	1.70E-03	2.46E-03	2.80E-02	8.05E-02	1.81E-01
2125.	5.13E-04	7.36E-04	1.40E-03	3.52E-03	3.51E-02	9.61E-02	2.05E-01
2130.	4.88E-04	6.96E-04	1.38E-03	4.98E-03	4.38E-02	1.15E-01	2.31E-01
2135.	4.80E-04	7.11E-04	1.53E-03	6.91E-03	5.46E-02	1.37E-01	2.61E-01
2140.	4.78E-04	7.30E-04	1.73E-03	9.55E-03	6.73E-02	1.63E-01	2.95E-01
2145.	4.82E-04	7.52E-04	1.95E-03	1.31E-02	8.27E-02	1.92E-01	3.32E-01
2150.	4.91E-04	7.81E-04	2.20E-03	1.82E-02	1.01E-01	2.25E-01	3.73E-01
2155.	5.05E-04	8.16E-04	2.47E-03	2.52E-02	1.24E-01	2.62E-01	4.18E-01
2160.	5.22E-04	8.56E-04	2.78E-03	3.43E-02	1.53E-01	3.06E-01	4.68E-01
2165.	5.47E-04	9.16E-04	3.25E-03	4.63E-02	1.88E-01	3.55E-01	5.22E-01
2170.	5.81E-04	1.01E-03	4.03E-03	6.16E-02	2.28E-01	4.07E-01	5.80E-01
2175.	6.28E-04	1.18E-03	5.68E-03	8.20E-02	2.76E-01	4.67E-01	6.42E-01
2180.	6.95E-04	1.46E-03	8.82E-03	1.09E-01	3.32E-01	5.36E-01	7.10E-01
2185.	7.83E-04	1.91E-03	1.40E-02	1.43E-01	3.95E-01	6.13E-01	7.82E-01
2190.	9.01E-04	2.60E-03	2.18E-02	1.88E-01	4.70E-01	7.00E-01	8.57E-01
2195.	1.06E-03	3.91E-03	3.34E-02	2.46E-01	5.58E-01	7.93E-01	9.32E-01
2200.	1.28E-03	6.27E-03	5.00E-02	3.15E-01	6.56E-01	8.93E-01	1.00E-00
2205.	1.69E-03	1.02E-02	7.20E-02	3.97E-01	7.67E-01	1.00E-00	1.08E-00
2210.	2.45E-03	1.65E-02	1.00E-01	4.92E-01	8.88E-01	1.11E-00	1.17E-00
2215.	4.28E-03	2.74E-02	1.41E-01	6.01E-01	1.01E-00	1.23E-00	1.26E-00
2220.	7.95E-03	4.54E-02	2.02E-01	7.28E-01	1.16E-00	1.35E-00	1.36E-00

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AC02

WAVE NUMBER (1/CM)	TEMPERATURE (DEGREES KELVIN)						
	300.	600.	900.	1200.	1500.	1800.	2100.
2225.	1.60E-02	7.54E-02	2.79E-01	8.76E-01	1.31E-00	1.48E-00	1.45E-00
2230.	3.10E-02	1.22E-01	3.67E-01	1.04E-00	1.48E-00	1.61E-00	1.55E-00
2235.	5.71E-02	1.85E-01	4.73E-01	1.24E-00	1.65E-00	1.74E-00	1.64E-00
2240.	9.84E-02	2.66E-01	6.05E-01	1.46E-00	1.84E-00	1.86E-00	1.72E-00
2245.	1.56E-01	3.65E-01	7.70E-01	1.71E-00	2.03E-00	1.99E-00	1.80E-00
2250.	2.32E-01	4.86E-01	9.75E-01	1.98E-00	2.22E-00	2.11E-00	1.87E-00
2255.	3.15E-01	6.30E-01	1.22E-00	2.28E-00	2.42E-00	2.22E-00	1.93E-00
2260.	3.93E-01	7.98E-01	1.53E-00	2.60E-00	2.61E-00	2.32E-00	1.98E-00
2265.	4.63E-01	1.00E-00	1.90E-00	2.93E-00	2.79E-00	2.41E-00	2.03E-00
2270.	5.21E-01	1.26E-00	2.36E-00	3.27E-00	2.96E-00	2.49E-00	2.06E-00
2275.	6.17E-01	1.63E-00	2.89E-00	3.61E-00	3.12E-00	2.55E-00	2.08E-00
2280.	7.99E-01	2.20E-00	3.52E-00	3.94E-00	3.26E-00	2.61E-00	2.10E-00
2285.	1.17E-00	3.05E-00	4.25E-00	4.25E-00	3.38E-00	2.65E-00	2.11E-00
2290.	1.84E-00	4.32E-00	5.10E-00	4.53E-00	3.48E-00	2.69E-00	2.12E-00
2295.	2.89E-00	5.83E-00	5.96E-00	4.76E-00	3.55E-00	2.70E-00	2.12E-00
2300.	4.40E-00	7.42E-00	6.77E-00	4.95E-00	3.60E-00	2.71E-00	2.11E-00
2305.	6.36E-00	9.18E-00	7.44E-00	5.07E-00	3.62E-00	2.70E-00	2.10E-00
2310.	8.72E-00	1.12E+01	7.90E-00	5.14E-00	3.63E-00	2.69E-00	2.07E-00
2315.	1.11E+01	1.31E+01	8.16E-00	5.16E-00	3.62E-00	2.67E-00	2.05E-00
2320.	1.34E+01	1.46E+01	8.25E-00	5.14E-00	3.60E-00	2.65E-00	2.01E-00
2325.	1.53E+01	1.51E+01	8.18E-00	5.12E-00	3.59E-00	2.64E-00	1.99E-00
2330.	1.67E+01	1.42E+01	7.97E-00	5.08E-00	3.57E-00	2.61E-00	1.95E-00
2335.	1.75E+01	1.27E+01	7.70E-00	5.08E-00	3.56E-00	2.57E-00	1.90E-00
2340.	1.76E+01	1.11E+01	7.45E-00	5.10E-00	3.55E-00	2.53E-00	1.85E-00
2345.	1.74E+01	1.03E+01	7.43E-00	5.15E-00	3.52E-00	2.46E-00	1.76E-00
2350.	1.73E+01	1.11E+01	7.87E-00	5.27E-00	3.50E-00	2.40E-00	1.69E-00
2355.	1.81E+01	1.32E+01	8.85E-00	5.35E-00	3.43E-00	2.29E-00	1.59E-00
2360.	1.95E+01	1.56E+01	1.00E+01	5.33E-00	3.28E-00	2.12E-00	1.43E-00
2365.	2.09E+01	1.71E+01	1.01E+01	5.11E-00	3.05E-00	1.94E-00	1.29E-00
2370.	2.11E+01	1.80E+01	9.50E-00	4.90E-00	2.69E-00	1.67E-00	1.09E-00
2375.	1.82E+01	1.60E+01	7.83E-00	3.91E-00	2.28E-00	1.41E-00	8.50E-01
2380.	1.01E+01	7.20E-00	6.00E-00	3.07E-00	1.77E-00	1.05E-00	6.50E-01
2385.	1.19E-00	2.54E-00	3.45E-00	2.19E-00	1.35E-00	8.02E-01	4.50E-01
2390.	2.97E-01	9.97E-01	1.70E-00	1.20E-00	7.80E-01	4.80E-01	3.00E-01
2395.	9.75E-02	2.61E-01	3.62E-01	4.95E-01	3.81E-01	3.21E-01	1.75E-01
2400.	5.01E-02	7.50E-02	1.00E-01	1.50E-01	1.50E-01	1.30E-01	1.00E-01

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The Spectral Band Parameter $S_{\frac{1}{2}}/d$ as a Function
of Temperature

C°K

WAVE NUMBER (1/CM)	TEMPERATURE (DEGREES KELVIN)						
	300.	600.	900.	1200.	1500.	1800.	2100.
2050.	4.60E-02	6.60E-02	1.33E-01	3.35E-01	7.90E-01	2.90E-00	8.90E-00
2055.	4.90E-02	7.00E-02	1.37E-01	3.52E-01	8.85E-01	3.20E-00	9.39E-00
2060.	5.25E-02	7.50E-02	1.49E-01	3.76E-01	1.00E-00	3.60E-00	1.00E+01
2065.	5.68E-02	8.00E-02	1.59E-01	3.92E-01	1.13E-00	4.00E-00	1.07E+01
2070.	6.00E-02	8.42E-02	1.68E-01	4.10E-01	1.28E-00	4.40E-00	1.13E+01
2075.	6.31E-02	8.81E-02	1.76E-01	4.31E-01	1.45E-00	4.81E-00	1.19E+01
2080.	6.67E-02	9.25E-02	1.84E-01	4.56E-01	1.63E-00	5.23E-00	1.25E+01
2085.	7.06E-02	1.01E-01	2.06E-01	4.81E-01	1.84E-00	5.66E-00	1.31E+01
2090.	7.42E-02	1.19E-01	2.56E-01	5.02E-01	2.06E-00	6.10E-00	1.37E+01
2095.	7.71E-02	1.42E-01	3.23E-01	5.47E-01	2.30E-00	6.55E-00	1.42E+01
2100.	7.89E-02	1.67E-01	3.95E-01	6.00E-01	2.54E-00	7.00E-00	1.47E+01
2105.	8.01E-02	1.87E-01	4.58E-01	6.71E-01	2.78E-00	7.45E-00	1.52E+01
2110.	8.13E-02	2.01E-01	5.00E-01	7.60E-01	3.04E-00	7.90E-00	1.57E+01
2115.	8.25E-02	2.10E-01	5.29E-01	8.62E-01	3.30E-00	8.33E-00	1.62E+01
2120.	8.40E-02	2.19E-01	5.58E-01	9.73E-01	3.59E-00	8.76E-00	1.66E+01
2125.	8.54E-02	2.27E-01	5.86E-01	1.09E-00	3.89E-00	9.18E-00	1.70E+01
2130.	8.68E-02	2.35E-01	6.12E-01	1.24E-00	4.19E-00	9.60E-00	1.75E+01
2135.	8.82E-02	2.43E-01	6.38E-01	1.41E-00	4.50E-00	1.00E+01	1.78E+01
2140.	8.97E-02	2.50E-01	6.66E-01	1.60E-00	4.85E-00	1.04E+01	1.82E+01
2145.	9.12E-02	2.58E-01	6.99E-01	1.80E-00	5.22E-00	1.08E+01	1.86E+01
2150.	9.28E-02	2.66E-01	7.40E-01	2.01E-00	5.63E-00	1.12E+01	1.90E+01
2155.	9.44E-02	2.77E-01	7.96E-01	2.25E-00	6.06E-00	1.16E+01	1.94E+01
2160.	9.60E-02	2.95E-01	8.77E-01	2.51E-00	6.48E-00	1.20E+01	1.98E+01
2165.	9.74E-02	3.21E-01	9.81E-01	2.81E-00	6.91E-00	1.25E+01	2.01E+01
2170.	9.87E-02	3.55E-01	1.11E-00	3.15E-00	7.35E-00	1.30E+01	2.03E+01
2175.	1.00E-01	3.90E-01	1.25E-00	3.51E-00	7.80E-00	1.34E+01	2.04E+01
2180.	1.02E-01	4.22E-01	1.40E-00	3.91E-00	8.26E-00	1.39E+01	2.05E+01
2185.	1.06E-01	4.54E-01	1.55E-00	4.35E-00	8.75E-00	1.43E+01	2.05E+01
2190.	1.12E-01	4.90E-01	1.72E-00	4.81E-00	9.27E-00	1.47E+01	2.06E+01
2195.	1.20E-01	5.31E-01	1.90E-00	5.30E-00	9.86E-00	1.51E+01	2.08E+01
2200.	1.29E-01	5.81E-01	2.10E-00	5.81E-00	1.05E+01	1.56E+01	2.10E+01
2205.	1.40E-01	6.37E-01	2.31E-00	6.35E-00	1.12E+01	1.60E+01	2.13E+01
2210.	1.52E-01	6.97E-01	2.54E-00	6.90E-00	1.19E+01	1.64E+01	2.17E+01
2215.	1.67E-01	7.64E-01	2.77E-00	7.46E-00	1.26E+01	1.68E+01	2.21E+01
2220.	1.87E-01	8.40E-01	3.02E-00	8.02E-00	1.33E+01	1.72E+01	2.25E+01

G-4

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WAVE NUMBER (1/CM)	CØZK TEMPERATURE (DEGREES KELVIN)						
	300.	600.	900.	1200.	1500.	1800.	2100.
2225.	2.17E-01	9.40E-01	3.31E-00	8.57E-00	1.40E+01	1.77E+01	2.30E+01
2230.	2.65E-01	1.08E-00	3.65E-00	9.12E-00	1.45E+01	1.81E+01	2.35E+01
2235.	3.34E-01	1.26E-00	4.03E-00	9.66E-00	1.50E+01	1.86E+01	2.39E+01
2240.	4.31E-01	1.48E-00	4.43E-00	1.01E+01	1.55E+01	1.89E+01	2.41E+01
2245.	5.51E-01	1.75E-00	4.84E-00	1.06E+01	1.58E+01	1.90E+01	2.38E+01
2250.	6.93E-01	2.04E-00	5.25E-00	1.11E+01	1.59E+01	1.89E+01	2.33E+01
2255.	8.50E-01	2.34E-00	5.63E-00	1.15E+01	1.60E+01	1.87E+01	2.26E+01
2260.	1.01E-00	2.65E-00	5.99E-00	1.18E+01	1.59E+01	1.85E+01	2.17E+01
2265.	1.19E-00	2.93E-00	6.29E-00	1.21E+01	1.58E+01	1.82E+01	2.07E+01
2270.	1.38E-00	3.20E-00	6.55E-00	1.24E+01	1.57E+01	1.78E+01	1.96E+01
2275.	1.58E-00	3.46E-00	6.79E-00	1.26E+01	1.54E+01	1.72E+01	1.83E+01
2280.	1.81E-00	3.75E-00	7.06E-00	1.27E+01	1.52E+01	1.67E+01	1.74E+01
2285.	2.12E-00	4.05E-00	7.39E-00	1.28E+01	1.50E+01	1.62E+01	1.65E+01
2290.	2.57E-00	4.37E-00	7.80E-00	1.28E+01	1.48E+01	1.58E+01	1.59E+01
2295.	3.18E-00	4.78E-00	8.30E-00	1.28E+01	1.45E+01	1.53E+01	1.53E+01
2300.	4.01E-00	5.38E-00	8.90E-00	1.27E+01	1.42E+01	1.47E+01	1.45E+01
2305.	5.04E-00	6.22E-00	9.55E-00	1.25E+01	1.37E+01	1.42E+01	1.38E+01
2310.	6.26E-00	7.39E-00	1.02E+01	1.23E+01	1.32E+01	1.34E+01	1.30E+01
2315.	7.67E-00	8.71E-00	1.07E+01	1.20E+01	1.27E+01	1.28E+01	1.24E+01
2320.	9.31E-00	1.00E+01	1.12E+01	1.16E+01	1.22E+01	1.21E+01	1.15E+01
2325.	1.09E+01	1.10E+01	1.14E+01	1.13E+01	1.16E+01	1.14E+01	1.08E+01
2330.	1.22E+01	1.14E+01	1.12E+01	1.08E+01	1.10E+01	1.07E+01	1.00E+01
2335.	1.34E+01	1.13E+01	1.08E+01	1.03E+01	1.03E+01	9.86E-00	9.13E-00
2340.	1.44E+01	1.10E+01	1.04E+01	9.85E-00	9.70E-00	9.22E-00	8.52E-00
2345.	1.53E+01	1.06E+01	9.90E-00	9.16E-00	8.88E-00	8.36E-00	7.81E-00
2350.	1.59E+01	1.06E+01	9.50E-00	8.51E-00	8.15E-00	7.61E-00	7.22E-00
2355.	1.52E+01	9.45E-00	8.65E-00	7.77E-00	7.36E-00	6.85E-00	6.50E-00
2360.	1.33E+01	8.01E+00	7.60E-00	6.87E-00	6.33E-00	5.77E-00	5.45E-00
2365.	1.03E+01	7.27E-00	7.61E-00	6.15E-00	5.56E-00	5.05E-00	4.66E-00
2370.	6.97E-00	6.43E-00	5.90E-00	5.50E-00	4.58E-00	4.12E-00	3.67E-00
2375.	4.45E-00	4.95E-00	5.01E-00	4.10E-00	3.76E-00	3.36E-00	2.97E-00
2380.	2.65E-00	3.50E-00	4.10E-00	2.80E-00	2.30E-00	1.90E-00	1.60E-00
2385.	1.51E-00	2.28E-00	3.00E-00	2.05E-00	1.70E-00	1.27E-00	1.15E-00
2390.	9.98E-01	1.40E+00	1.90E-00	1.40E-00	1.20E-00	1.00E-00	9.00E-01
2395.	6.25E-01	7.59E-01	1.20E-00	1.09E-00	9.00E-01	8.65E-01	8.40E-01
2400.	4.03E-01	5.51E-01	6.63E-01	8.00E-01	8.00E-01	8.10E-01	8.00E-01

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APPENDIX H

Carbon Dioxide Emission Data for the range 500-800 cm^{-1} .

This appendix presents the Carbon Dioxide Emission data as contained in the report:

Ludwig, C.R., "Tables of Carbon Dioxide Absorption Coefficients", obtained from private communications with Dr. Ludwig when he was at G.D.

The equations utilizing this data are presented in Section 3.2.

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ABSORPTION COEFFICIENTS OF CO₂

K (PER CM AT STP)

15 MICRON FUNDAMENTAL BAND

1/CM	MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K
500	20.00	.0000E 00	.0000E 00	.0000E 00	.1050E-01	.3000E-01	.8800E-01
505	19.80	.0000E 00	.0000E 00	.0000E 00	.1800E-01	.4900E-01	.8000E-01
510	19.60	.0000E 00	.0000E 00	.0000E 00	.3000E-01	.5400E-01	.7400E-01
515	19.41	.0000E 00	.0000E 00	.0000E 00	.3000E-01	.5600E-01	.8900E-01
520	19.23	.0000E 00	.0000E 00	.0000E 00	.3300E-01	.6900E-01	.9900E-01
525	19.04	.0000E 00	.0000E 00	.6800E-02	.3800E-01	.7200E-01	.9700E-01
530	18.86	.0000E 00	.0000E 00	.1100E-01	.5300E-01	.9500E-01	.1240E 00
535	18.69	.0000E 00	.0000E 00	.2850E-01	.6300E-01	.9900E-01	.1400E 00
540	18.51	.0000E 00	.0000E 00	.3300E-01	.6800E-01	.1030E 00	.1340E 00
545	18.34	.0000E 00	.0000E 00	.4500E-01	.9200E-01	.1380E 00	.1760E 00
550	18.18	.0000E 00	.0000E 00	.4900E-01	.9700E-01	.1480E 00	.1910E 00
555	18.01	.0000E 00	.0000E 00	.4900E-01	.1200E 00	.1880E 00	.2470E 00
560	17.85	.0000E 00	.0000E 00	.4800E-01	.1260E 00	.2010E 00	.2410E 00
565	17.69	.0000E 00	.0000E 00	.8200E-01	.1980E 00	.2710E 00	.2650E 00
570	17.54	.0000E 00	.7500E-02	.6900E-01	.1400E 00	.2250E 00	.3400E 00
575	17.39	.0000E 00	.2050E-01	.6200E-01	.1450E 00	.2360E 00	.5300E 00
580	17.24	.0000E 00	.3550E-01	.1170E 00	.1930E 00	.2950E 00	.5500E 00
585	17.09	.1570E-01	.5200E-01	.1700E 00	.2350E 00	.3050E 00	.4100E 00
590	16.94	.1500E-01	.8800E-01	.2700E 00	.3300E 00	.4400E 00	.5200E 00
595	16.80	.5100E-01	.1300E 00	.4000E 00	.5300E 00	.5600E 00	.5400E 00
600	16.66	.1200E 00	.1650E 00	.2750E 00	.3200E 00	.4200E 00	.5600E 00
605	16.52	.8800E-01	.1900E 00	.4300E 00	.5400E 00	.6200E 00	.6800E 00
610	16.39	.1100E 00	.3500E 00	.7100E 00	.7600E 00	.9100E 00	.6900E 00
615	16.26	.1800E 00	.4700E 00	.9200E 00	.9700E 00	.7800E 00	.6700E 00
620	16.12	.9700E-01	.2650E 00	.6100E 00	.7200E 00	.7800E 00	.7300E 00
625	16.00	.1750E 00	.3800E 00	.7200E 00	.7900E 00	.8300E 00	.8400E 00

H-2

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)
K (PER CM AT STP)

15 MICRON FUNDAMENTAL BAND

1/CM	MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K
630	15.87	.3700E 00	.6400E 00	.9200E 00	.9600E 00	.9800E 00	.9400E 00
635	15.74	.5900E 00	.8400E 00	.1070E 01	.1100E 01	.1110E 01	.1060E 01
640	15.62	.9400E 00	.1130E 01	.1150E 01	.1150E 01	.1150E 01	.1180E 01
645	15.50	.1960E 01	.1770E 01	.1460E 01	.1360E 01	.1320E 01	.1390E 01
650	15.38	.3450E 01	.2820E 01	.1950E 01	.1720E 01	.1560E 01	.1480E 01
655	15.26	.2820E 01	.2450E 01	.2000E 01	.1900E 01	.1860E 01	.2050E 01
660	15.15	.2540E 01	.2340E 01	.1840E 01	.1760E 01	.1740E 01	.2030E 01
665	15.03	.1420E 02	.8600E 01	.3700E 01	.2600E 01	.1960E 01	.1420E 01
670	14.92	.4500E 01	.5700E 01	.5800E 01	.5200E 01	.3500E 01	.4200E 01
675	14.81	.3600E 01	.3100E 01	.3300E 01	.2900E 01	.2050E 01	.2000E 01
680	14.70	.3100E 01	.2600E 01	.2000E 01	.1960E 01	.1800E 01	.2100E 01
685	14.59	.2400E 01	.2500E 01	.2300E 01	.2200E 01	.1700E 01	.1940E 01
690	14.49	.1820E 01	.2000E 01	.2180E 01	.2050E 01	.1840E 01	.1300E 01
695	14.38	.1040E 01	.1350E 01	.1720E 01	.1720E 01	.1650E 01	.1300E 01
700	14.28	.5500E 00	.1200E 01	.1430E 01	.1470E 01	.1480E 01	.1250E 01
705	14.18	.1360E 01	.1290E 01	.1280E 01	.1350E 01	.1380E 01	.1340E 01
710	14.08	.2100E 00	.7800E 00	.1270E 01	.1330E 01	.1370E 01	.1320E 01
715	13.98	.1900E 00	.7800E 00	.1400E 01	.1460E 01	.1470E 01	.1420E 01
720	13.88	.9000E 00	.1060E 01	.1400E 01	.1500E 01	.1550E 01	.1340E 01
725	13.79	.7200E-01	.3000E 00	.8000E 00	.1000E 01	.1150E 01	.1260E 01
730	13.69	.6400E-01	.2100E 00	.5600E 00	.7200E 00	.8600E 00	.1020E 01
735	13.60	.6800E-01	.2100E 00	.5300E 00	.6700E 00	.7900E 00	.1010E 01
740	13.51	.6900E-01	.2100E 00	.5400E 00	.6900E 00	.8200E 00	.9100E 00
745	13.42	.3300E-01	.1400E 00	.3900E 00	.5300E 00	.1650E 04	.7700E 00
750	13.33	.2300E-01	.7800E-01	.2700E 00	.4100E 00	.5600E 00	.8900E 00
755	13.24	.3000E-01	.8600E-01	.2800E 00	.4000E 00	.5200E 00	.7100E 00
760	13.15	.1750E-01	.6200E-01	.2250E 00	.3350E 00	.4500E 00	.6600E 00
765	13.07	.1050E-01	.4500E-01	.1800E 00	.2800E 00	.3800E 00	.6000E 00
770	12.98	.4500E-02	.3000E-01	.1480E 00	.2400E 00	.3450E 00	.5700E 00

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ABSORPTION COEFFICIENTS OF CO2 (CONT'D)							
K (PER CM AT STP)							
15 MICRON FUNDAMENTAL BAND							
1/CM	MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K
775	12.90	.000E 00	.140E-01	.124E 00	.205E 00	.285E 00	.430E 00
780	12.82	.000E 00	.115E-01	.110E 00	.185E 00	.260E 00	.375E 00
785	12.73	.000E 00	.135E-01	.840E-01	.140E 00	.205E 00	.335E 00
790	12.65	.000E 00	.430E-02	.650E-01	.120E 00	.183E 00	.325E 00
795	12.57	.000E 00	.000E 00	.540E-01	.115E 00	.180E 00	.315E 00
800	12.50	.000E 00	.000E 00	.440E-01	.950E-01	.150E 00	.270E 00
805	12.42	.000E 00	.000E 00	.360E-01	.790E-01	.125E 00	.205E 00
810	12.34	.000E 00	.000E 00	.250E-01	.650E-01	.110E 00	.178E 00
815	12.26	.000E 00	.000E 00	.180E-01	.620E-01	.103E 00	.153E 00
820	12.19	.000E 00	.000E 00	.320E-01	.580E-01	.860E-01	.147E 00
825	12.12	.000E 00	.000E 00	.800E-02	.510E-01	.870E-01	.134E 00
830	12.04	.000E 00	.000E 00	.600E-02	.480E-01	.830E-01	.133E 00
835	11.97	.000E 00	.000E 00	.000E 00	.430E-01	.780E-01	.118E 00
840	11.90	.000E 00	.000E 00	.000E 00	.420E-01	.700E-01	.108E 00
845	11.83	.000E 00	.000E 00	.000E 00	.360E-01	.640E-01	.980E-01
850	11.76	.000E 00	.000E 00	.000E 00	.350E-01	.610E-01	.870E-01
855	11.69	.000E 00	.000E 00	.000E 00	.320E-01	.560E-01	.860E-01
860	11.62	.000E 00	.000E 00	.000E 00	.330E-01	.560E-01	.750E-01
865	11.56	.000E 00	.000E 00	.000E 00	.300E-01	.530E-01	.750E-01
870	11.49	.000E 00	.000E 00	.000E 00	.290E-01	.530E-01	.850E-01
875	11.42	.000E 00	.000E 00	.000E 00	.240E-01	.470E-01	.900E-01
880	11.36	.000E 00	.000E 00	.000E 00	.220E-01	.450E-01	.860E-01

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APPENDIX I

Ludwig emission model for the CO₂ 1900-2395 cm⁻¹ band.

The Ludwig model is included in this report as at one time it was under consideration for use in "HIDE". It was found, however, to be slightly inferior to Jackson for plume predictor comparisons and thus was not used.

The transmission equation of Ludwig is defined as:

$$= \text{EXP}(-KU / \sqrt{1 + KU/4A})$$

$$U = PP_{\text{CO}_2} * P * PL * 273/T$$

$$P = \text{Pressure (atmospheres)}$$

$$PP_{\text{CO}_2} = \text{Partial pressure (carbon dioxide)}$$

$$PL = \text{path length}$$

$$T = \text{temperature } ^\circ\text{K}$$

A, K from tables in this appendix.

To determine A, K in steps of 5 cm⁻¹ as required by "HIDE" for this band a third order collocation polynomial was used. In order to interpolate between temperatures, a second order quadratic was passed through the 300, 600, 1200 °K points. Thus, the "HIDE" A, K agree exactly with the Ludwig data at the tabulated values and varies smoothly between them.

The data itself comes from a report by Ludwig, C.R., titled "Table of Carbon Dioxide Absorption Coefficients", obtained from private communications with Dr. Ludwig when he was at General Dynamics.

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ABSORPTION COEFFICIENTS OF CO₂

K (PER CM AT STP)

4.3 MICRON FUNDAMENTAL BAND

1/CM MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K	3000 K
1900	5.26	-0.	-0.	-0.	-0.	-0.	6.923-02
1910	5.24	-0.	-0.	-0.	-0.	-0.	8.943-02
1920	5.21	-0.	-0.	-0.	-0.	-0.	1.144-01
1930	5.18	-0.	-0.	-0.	-0.	-0.	1.447-01
1940	5.15	-0.	-0.	-0.	-0.	-0.	1.812-01
1950	5.13	-0.	-0.	-0.	-0.	-0.	2.259-01
1960	5.10	-0.	-0.	-0.	-0.	-0.	2.815-01
1970	5.08	-0.	-0.	-0.	-0.	-0.	3.504-01
1980	5.05	-0.	-0.	-0.	-0.	-0.	4.352-01
1990	5.03	-0.	-0.	6.525-05-0.	6.443-02	5.372-01	
2000	5.00	-0.	-0.	1.305-04-0.	1.289-01	6.558-01	
2010	4.98	-0.	-0.	3.076-04-0.	1.727-01	8.004-01	
2020	4.95	-0.	-0.	4.848-04-0.	2.284-01	9.665-01	
2030	4.93	-0.	-0.	1.098-03-0.	2.985-01	1.159+00	
2040	4.90	-0.	-0.	1.712-03-0.	3.883-01	1.427+00	
2050	4.88	-0.	-0.	3.710-03-0.	5.030-01	1.662+00	
2060	4.85	-0.	-0.	5.708-03-0.	6.485-01	1.958+00	
2070	4.83	-0.	-0.	1.178-02-0.	8.320-01	2.299+00	
2080	4.81	-0.	-0.	1.785-02-0.	1.059+00	2.802+00	
2090	4.78	-0.	-0.	3.491-02	1.461-01	3.171+00	
2100	4.76	-0.	-0.	5.196-02	2.923-01	3.651+00	
2110	4.74	-0.	-0.	8.608-02	4.157-01	4.180+00	
2120	4.72	-0.	-0.	1.396-01	5.813-01	4.881+00	
2130	4.69	-0.	-0.	2.216-01	8.043-01	5.474+00	
2140	4.67	-0.	-0.	3.746-02	1.104+00	6.125+00	
2150	4.65	-0.	-0.	7.491-02	5.212-01	7.315+00	

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ABSORPTION COEFFICIENTS OF CO ₂ (CONT'D)										
K (PER CM AT STP)										
4.3 MICRON FUNDAMENTAL BAND										
1/CM MICRON	300 K	500 K	1200 K	1500 K	1800 K	2400 K	3000 K			
2155	4.64	-0.	1.012-01	6.468-01	1.758+00	4.898+00	7.494+00			
2160	4.63	-0.	1.357-01	7.724-01	2.016+00	5.276+00	7.673+00			
2165	4.62	-0.	1.907-01	9.488-01	2.340+00	5.722+00	8.006+00			
2170	4.61	-0.	2.388-01	1.125+00	2.664+00	6.169+00	8.339+00			
2175	4.60	-0.	3.134-01	1.372+00	3.066+00	6.652+00	8.670+00			
2180	4.59	-0.	4.081-01	1.618+00	3.467+00	7.136+00	9.000+00			
2185	4.58	-0.	5.274-01	1.954+00	3.960+00	7.724+00	9.742+00			
2190	4.57	-0.	6.765-01	2.289+00	4.453+00	8.313+00	1.048+01			
2195	4.56	-0.	3.728-04	8.611-01	2.734+00	5.037+00	8.829+00			
2200	4.55	-0.	7.456-04	1.088+00	3.180+00	5.621+00	9.344+00			
2205	4.54	-0.	1.444-03	1.364+00	3.753+00	6.284+00	9.870+00			
2210	4.52	-0.	2.760-03	1.702+00	4.326+00	6.975+00	1.040+01			
2215	4.51	-0.	5.202-03	2.110+00	5.042+00	7.706+00	1.090+01			
2220	4.50	-0.	9.661-03	2.606+00	5.758+00	8.493+00	1.140+01			
2225	4.49	-0.	1.767-02	3.191+00	6.629+00	9.294+00	1.200+01			
2230	4.48	-0.	3.183-02	3.883+00	7.500+00	1.016+01	1.261+01			
2235	4.47	-0.	5.641-02	4.690+00	8.494+00	1.098+01	1.298+01			
2240	4.46	-0.	9.829-02	5.614+00	9.489+00	1.185+01	1.336+01			
2245	4.45	3.678-05	1.683-01	6.679+00	1.059+01	1.276+01	1.366+01			
2250	4.44	7.757-05	2.829-01	7.846+00	1.168+01	1.351+01	1.396+01			
2255	4.43	2.543-04	4.667-01	9.179+00	1.288+01	1.439+01	1.479+01			
2260	4.42	8.058-04	7.550-01	1.058+01	1.398+01	1.521+01	1.562+01			
2265	4.42	2.464-03	1.197+00	1.213+01	1.517+01	1.585+01	1.525+01			
2270	4.41	7.260-03	1.856+00	1.368+01	1.620+01	1.640+01	1.489+01			
2275	4.40	2.056-02	2.816+00	1.533+01	1.726+01	1.697+01	1.483+01			
2280	4.39	5.587-02	4.174+00	1.689+01	1.812+01	1.734+01	1.477+01			
2285	4.38	1.452-01	6.032+00	1.842+01	1.907+01	1.789+01	1.462+01			
2290	4.37	3.602-01	8.490+00	1.985+01	1.960+01	1.793+01	1.447+01			
2295	4.36	8.492-01	1.162+01	2.092+01	2.000+01	1.817+01	1.510+01			

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)
K (PER CM AT STP)

4.3 MICRON FUNDAMENTAL BAND

1/CM	MICRON	300 K	600 K	1200 K	1500 K	1800 K	2400 K	3000 K
2300	4.35	1.896+00	1.550+01	2.209+01	2.042+01	1.858+01	1.574+01	1.317+01
2305	4.34	3.985+00	1.989+01	2.241+01	2.038+01	1.809+01	1.434+01	1.223+01
2310	4.33	7.844+00	2.482+01	2.329+01	2.092+01	1.849+01	1.474+01	1.129+01
2315	4.32	1.434+01	2.934+01	2.300+01	2.048+01	1.849+01	1.594+01	1.064+01
2320	4.31	2.407+01	3.349+01	2.327+01	2.072+01	1.815+01	1.384+01	9.987+00
2325	4.30	3.660+01	3.552+01	2.263+01	2.034+01	1.775+01	1.328+01	9.291+00
2330	4.29	4.955+01	3.616+01	2.262+01	2.039+01	1.766+01	1.271+01	8.593+00
2335	4.28	5.733+01	3.401+01	2.275+01	2.053+01	1.745+01	1.202+01	8.926+00
2340	4.27	5.428+01	2.931+01	2.258+01	2.116+01	1.785+01	1.308+01	9.257+00
2345	4.26	3.709+01	2.640+01	2.308+01	2.033+01	1.654+01	1.039+01	8.216+00
2350	4.26	1.138+01	2.082+01	2.282+01	2.028+01	1.680+01	1.113+01	7.175+00
2355	4.25	5.283+01	3.627+01	2.523+01	1.989+01	1.706+01	1.177+01	6.247+00
2360	4.24	7.796+01	4.701+01	2.620+01	2.047+01	1.556+01	9.080+00	5.319+00
2365	4.23	7.550+01	5.033+01	2.546+01	1.939+01	1.464+01	8.851+00	4.436+00
2370	4.22	5.149+01	4.548+01	2.319+01	1.699+01	1.223+01	6.507+00	3.553+00
2375	4.21	2.410+01	3.436+01	1.960+01	1.446+01	1.066+01	6.027+00	2.653+00
2380	4.20	7.111+00	2.096+01	1.508+01	1.089+01	8.982+00	3.566+00	1.753+00
2385	4.19	1.123+00	9.634+00	1.063+01	8.434+00	6.427+00	3.568+00	1.263+00
2390	4.18	6.789+02	2.886+00	5.809+00	4.217+00	3.314+00	1.585+00	7.741-01
2395	4.18	6.472-04	3.776-01	2.817+00-0.		2.496+00	1.502+00-0.	

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ABSORPTION COEFFICIENTS OF CO₂
 SQR(4 X ALPHA X S/DXD) AT STP
 4.3 MICRON FUNDAMENTAL BAND

1/CM	MICRON	300 K	600 K	1200 K	1800 K	2400 K	3000 K
1900	5.26	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.5970E 01
1910	5.23	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.6838E 01
1920	5.20	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.7770E 01
1930	5.18	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.8734E 01
1940	5.15	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.9659E 01
1950	5.12	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1071E 02
1960	5.10	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1199E 02
1970	5.07	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1350E 02
1980	5.05	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1538E 02
1990	5.02	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1754E 02
2000	5.00	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.5683E 01	.1906E 02
2010	4.97	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.6562E 01	.2137E 02
2020	4.95	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.7510E 01	.2270E 02
2030	4.92	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.8402E 01	.2366E 02
2040	4.90	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.9496E 01	.3066E 02
2050	4.87	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1076E 02	.2753E 02
2060	4.85	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1228E 02	.2774E 02
2070	4.83	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1414E 02	.2828E 02
2080	4.80	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1651E 02	.3938E 02
2090	4.78	.0000E 00	.0000E 00	.0000E 00	.0000E 00	.1759E 02	.3272E 02
2100	4.76	.0000E 00	.0000E 00	.0000E 00	.5194E 01	.1907E 02	.3238E 02
2110	4.73	.0000E 00	.0000E 00	.0000E 00	.6106E 01	.2015E 02	.3220E 02
2120	4.71	.0000E 00	.0000E 00	.0000E 00	.7002E 01	.2288E 02	.3745E 02
2130	4.69	.0000E 00	.0000E 00	.0000E 00	.7990E 01	.2317E 02	.3523E 02
2140	4.67	.0000E 00	.0000E 00	.0000E 00	.9202E 01	.2380E 02	.3417E 02
2150	4.65	.0000E 00	.0000E 00	.1338E 01	.1065E 02	.3027E 02	.4727E 02

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ABSORPTION COEFFICIENTS OF CO₂ (CONT'D)
 SQRT(4 X ALPHA X S/DXD) AT STP
 4.3 MICRON FUNDAMENTAL BAND

1/CM MICRON	300 K	600 K	1200 K	1800 K	2400 K	3000 K
2160	4.62	.0000E 00	.0000E 00	.1808E 01	.1229E 02	.2632E 02
2170	4.60	.0000E 00	.0000E 00	.2396E 01	.1381E 02	.4610E 02
2180	4.58	.0000E 00	.0000E 00	.3102E 01	.1511E 02	.2607E 02
2190	4.56	.0000E 00	.0000E 00	.3912E 01	.1707E 02	.3119E 02
2200	4.54	.0000E 00	.4352E-01	.4765E 01	.1792E 02	.4584E 02
2210	4.52	.0000E 00	.8462E-01	.5631E 01	.1855E 02	.3513E 02
2220	4.50	.0000E 00	.1596E 00	.6654E 01	.1902E 02	.2760E 02
2230	4.48	.0000E 00	.2910E 00	.7799E 01	.2063E 02	.2636E 02
2240	4.46	.0000E 00	.5111E 00	.9013E 01	.2018E 02	.2932E 02
2250	4.44	.7172E-02	.8599E 00	.1023E 02	.1973E 02	.2641E 02
2260	4.42	.2312E-01	.1377E 01	.1125E 02	.2350E 02	.2418E 02
2270	4.40	.6896E-01	.2084E 01	.1192E 02	.1925E 02	.3368E 02
2280	4.38	.1882E 00	.2941E 01	.1236E 02	.1792E 02	.2225E 02
2290	4.36	.4647E 00	.3771E 01	.1250E 02	.1651E 02	.1928E 02
2300	4.34	.1018E 01	.4570E 01	.1307E 02	.1925E 02	.1668E 02
2310	4.32	.1937E 01	.5406E 01	.1255E 02	.1604E 02	.1521E 02
2320	4.31	.3064E 01	.6047E 01	.1175E 02	.1366E 02	.2244E 02
2330	4.29	.3916E 01	.6282E 01	.1066E 02	.1130E 02	.1642E 02
2340	4.27	.4019E 01	.6087E 01	.9964E 01	.1104E 02	.1299E 02
2350	4.25	.2883E 01	.5477E 01	.8262E 01	.8162E 01	.1005E 02
2360	4.23	.5110E 01	.5912E 01	.6719E 01	.5795E 01	.8410E 01
2370	4.21	.3784E 01	.4594E 01	.4666E 01	.3679E 01	.9106E 01
2380	4.20	.1410E 01	.2615E 01	.2528E 01	.1756E 01	.5804E 01
2390	4.18	.1595E 00	.8748E 00	.1045E 01	.7246E 00	.4580E 01
						.2735E 01
						.2039E 01
						.8297E 00
						.3334E 00

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APPENDIX J

Scattering Function

This section will attempt to present and explain the results of a study to determine the proper form of the scattering function to be used in Hide.

Most references on the subject give the form of the scattering function to be:

$$T_s = \text{EXP} (-AR \lambda^{-B})$$

where:

λ is wavelength in microns

A & B are constants dependent on meteorological conditions such as visual range and scattering particle size and concentration.

R is range.

Rayleigh scattering occurs when the particle size is much smaller than the radiation wavelength, and $B=4$. When $B=2$, the particle size equals the wavelength and is called mie scattering. Finally non selective scattering occurs for large particles when $B=0$. Since the size distribution for the important scattering particles lie in the infrared, i.e. Haze and fog are distributed around 3-5 μ and cumulus water droplets range from about 1-15 μ , this becomes a formidable problem and can only be solved exactly by knowing the conditions on a given day over the entire path. These conditions are hardly ever known so one must use what he believes to be a typical real atmosphere, derive the scattering function and hope the ensuing errors for a given day are minimal. This then was the approach used in the Hide model, that is an "exact" scattering function was derived for each of several real atmospheres and the average values of the resulting A's and B's were used to define the "typical atmosphere".

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The "Hide" real atmosphere was defined by Yates & Taylor in their work for N.R.L. in Washington, D.C. This project concerned itself with making accurate measurements of transmission over varied weather conditions. Data was then taken by Westinghouse off these curves at selected wavelengths falling within each of the eight major windows. This information was then fed into a computer program which upon dividing by the Wyatt Plass and Struel transmission was able to come up with a value of scattering at each wavelength. These scattering values were then used to perform a least squares curve fit to the function:

$$T_s = \text{EXP}(-AR \lambda^{-B})$$

The results of this exercise are shown in figure 1. The meteorological conditions under which Yates and Taylor recorded their measurements for each plate are given therein as:

RM = range in KM

RV = visual range in KM

Temp = ambient temp ($^{\circ}\text{F}$)

RH = relative humidity

The data shown under the column headings "WV", "Trans", "SCAT" are the wavelength at which the data was transcribed, the transmission read off the curves, and the calculated value of scattering respectively. A and B are given as the results of a curve fit to the presumed scattering function:

$$T_s = \text{EXP}(-AR \lambda^{-B}),$$

and the error shown is the sum of the squares of the difference between the actual and calculated values of scattering. An attempt was then

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carried out to determine whether or not A & B were correlated to temperature, relative humidity, absolute humidity, and visual range but no significant results were obtained. More data and a rigorous statistical analysis possibly would show some relationship but time did not allow and it is recommended that this be done in the future.

The average value of B is approximately 1 which determines the wavelength dependence of the scattering function. Since the value of A depends on B it would not be fitting to use an average value of A as typical. Instead since at $.55 \mu$ all the transmission is considered to be due to scattering and is related to visual range, a known quantity is a given day, A was adjusted to give an exact fit at this wavelength.

Hence the scattering function used in the Hide model is

$$T_s = \text{EXP}(-A \lambda^{-1})$$

where $A = f(\text{visual range})$.

The Yates and Taylor data is shown in Appendix D with the Hide transmission plotted in a heavy line over it for comparison. The top figure on each page is the optimum scattering function using the individual A & B's of figure 1 whereas the bottom figure is plotted with the Hide transmission. Using this as an error measure the Hide general function works fairly good.

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PLATE NO. 9	R=27.7	10 KM ALTITUDE			
QUANTITIES	20.00000	413.70000			
T55 =	.265	RV =	3.62000	.84900	.73000
		TPAIRS	81.597	TEMP =	43.000 RH =
					100.000
		SCAT			
		.5500			
		.2650			
		.3900			
		.4040			
		.3100			
		.7284			
		.6360			
		.0045			
		.0780			
		1.0000			
		.7279			
			A = .0300	B = 9146	Error = .4069
PLATE NO. 7	R=15.25				
QUANTITIES	27.70000				
T55 =	.100	RV =	4.55000	.49800	1.27000
		TPAIRS	27.608	TEMP =	74.000 RH =
					82.000
		SCAT			
		.5500			
		.1000			
		.3700			
		.0100			
		.4430			
		.5900			
		1.0000			
		.0132			
		1.0000			
		.4062			
			A = .0600	B = 1.436	Error = .8494
PLATE NO. 7	R=5.5				
QUANTITIES	0.40000				
T55 =	.360	RV =	1.54000	.16900	.66200
		TPAIRS	17.871	TEMP =	78.000 RH =
					73.000
		SCAT			
		.5500			
		.3000			
		.5300			
		.6600			
		.7200			
		.0000			
		.9100			
		.5000			
		.8200			
			A = .0881	B = 1.558	Error = .034

Fig. 1 (cont)

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